

APPENDIX B

GROUND SYSTEM HARDWARE TESTS

B. FLIGHT HARDWARE TESTS

B.1 SMGT-24/STIS AT/FT COMMAND PLAN VERIFICATION AND ADDITIONAL NOMINAL OPERATIONS COMMANDING

This Section provides detail information on the SMGT-24 STIS AT/FT Command Plan Verification **and additional nominal operations commanding.**

B.1.1 Purpose

SMGT-24 is a flight H/W test designed to verify the STIS Aliveness Test/Functional Test (AT/FT) portion of the command plan for the Second Servicing Mission and execute as much of the Science Institute commanding and instrument safing as possible in an ambient environment **utilizing SMS derived stored command loads in a flight operations manner.**

B.1.2 Objectives

- a. To execute the STIS (AT/FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the STIS instrument.
- c. To verify the STIS/ground system interface.
- d. To execute as much of the Science Institute commanding and instrument safing as possible in an ambient environment.
- e. **To obtain realistic science data sets in as many modes as possible to verify science data processing software.**

- f. **To verify the ground system can deliver the STIS science data generated during the FT to the STIS Principal Investigator.**

B.1.3 Activities

SMGT-24 will consist of two test runs, a dry run in which the STIS BRZ will be used to simulate the STIS instrument, and the execution of the test using the flight **hardware** (H/W). These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test runs will involve the VEST, ST OCC, **Data Operations Center** (DOC), SOC, **PACOR II**, **ST Sci** and NASCOM. The tests will execute the STIS portion of the command plan using the **flight** H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure. The dry run will validate the plan/procedure prior to its execution against the actual STIS instrument.

The SMS portion of the test will be executed via stored command loads generated by SPSS and PASS processing. In addition there will be processing of science data through PACOR II, OPUS and the Hubble Data Archive (HDA).

B.1.4 Roles and Responsibilities

This Section identifies the SMGT-24/STIS AT/FT Command Plan Verification support roles and responsibilities. (See Table B-1).

Table B-1. SMGT-24

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---|---|
| STOCC | PRS PASS, AEDP ESS TALOS, TMS, PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| ST ScI | SPSS/PASS/OPUS/HDA | ST ScI |
| SDPF | PACOR II | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, NSSC-1 STIS, STIS BRZ | GSFC CODE 512 GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 GSFC CODE 680, BASD |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.

- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.
Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT.
ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **Operations Support Team (OST)** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

Science Institute will provide support for the SMGT. Science Institute responsibilities are:

- attend the TRR.
- provide commanding to be executed in the Commanding and Safing portion of the SMGT.
- **monitor a console during the stored commanding (SMS) portion of the SMGT.**

B.1.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-24 as listed in Table B-1.

VEST **TEST FACILITY** REQUIREMENTS

The VEST facility requirements to support SMGT-24 are the **VEST Structure with a minimum of the** Rockwell digital 2's complement 24-bit computer (DF-224)/Coprocessor (COP), NASA Standard Spacecraft Computer (NSSC) I, **the Simulated Engineering and Science Tape Recorder (SIMESTR), Monitor and Science Instrument(s) Simulator (MASIS),** and the STIS instrument. The **STIS** BRZ will be used to simulate the STIS instrument during the dry run. The SMGT-24 configuration is given in Figure B-2.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-24 will simulate the communication links between GSFC and HST during the installation of STIS. This means SMGT-24 will be conducted in JSC mode. NASCOM, the SOC **and DCF** will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-24 will be conducted in the **SM Operations** Room (SMOR), with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, **Applications Processor (AP)**, **Transportable Telemetry and Command Processor (TTAC)** and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-1.

SMGT-24 PERSONNEL SUPPORT REQUIREMENTS

SMGT-24 test support will be required by the organizations listed in Table B-1, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. Lead organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES **OST** will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT **by maintaining** the JSC command

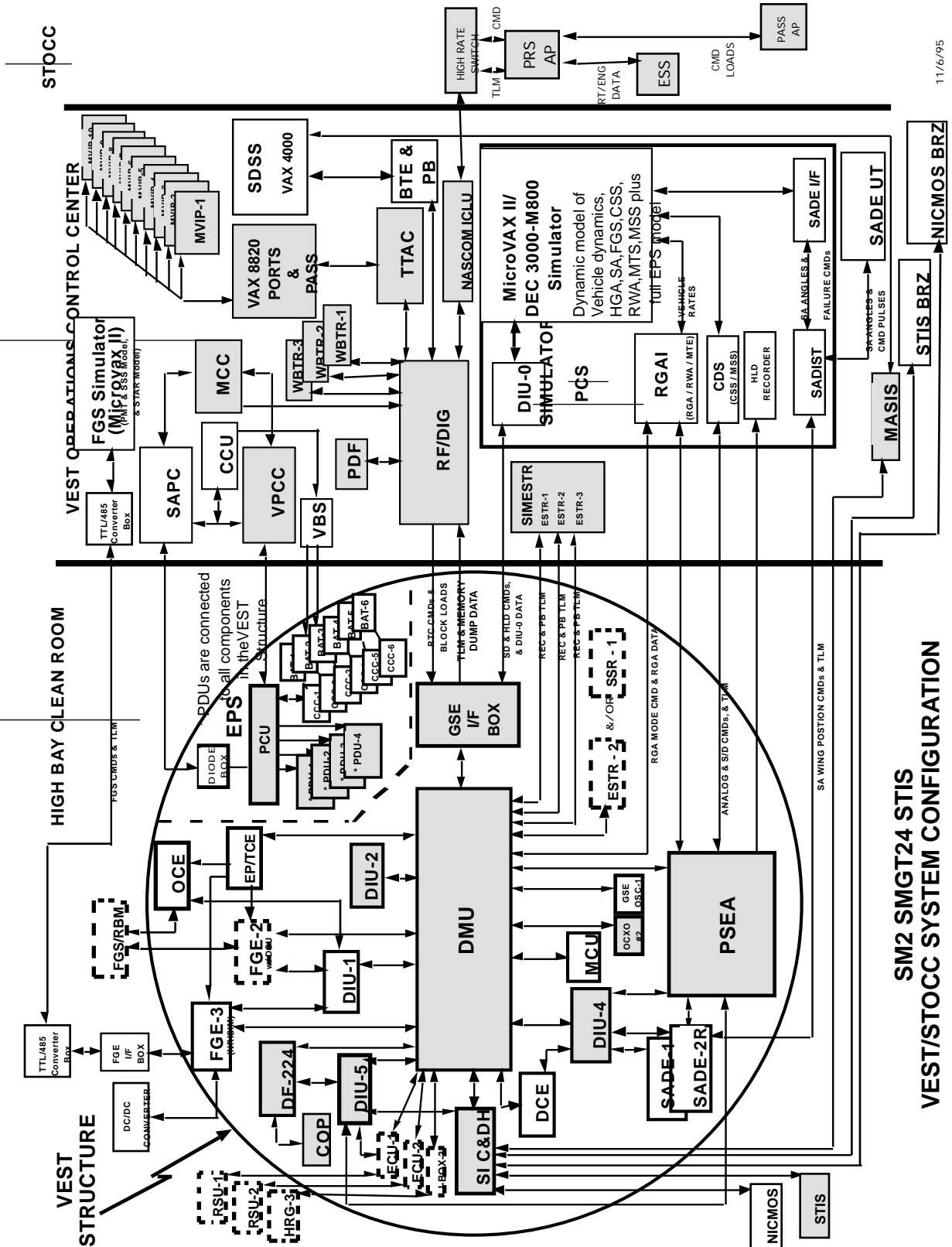


Figure B-2. STIS H/W SGMGT Overview

KEY: Items Shaded are applicable to SGMGT-24 STIS Test Configuration

link, and trouble shooting any communication problems that may occur during the test. **FS&S (Code 442) and IDT will be required to support the SMGT and ensure ORU safety and functionality.** The instrument development team (IDT) from **Ball Aero Space Division (BASD)** will be required to support the SMGT and insure instrument safety and functionality. The MOSES SI SE will be required to support the test and monitor the execution of the AT/FT **and the SMS.** Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the STIS AT/FT **or the appropriate pre and post conditioning commanding as defined in the SM2 Command Plan.**

The following ground system elements will be required to support SMGT-24:

B.1.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-24. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-24: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and imbedded software during the execution of the AT/FT.

B.1.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-24: SPSS, PRS, **OPUS** and AEDP. During SMGT-24, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets. **PASS will interface with OPUS for the transfer of archived engineering data.**

B.1.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 24, will be required to support test activities during SMGT-24. AEDP will support the following interface connections: PASS, ESS, and OPUS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-24. AEDP will interface with ESS and OPUS for the transfer of AEDP magnetic tape products.

B.1.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-24. ESS will support the following interface connections: PRS, AEDP, and OPUS. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes. **PASS will interface with OPUS for the transfer of archived engineering data.**

B.1.5.5 Telemetry Analysis and Logic for Operations Support. The most current release of the TALOS system will be required to support test activities during SMGT-24. TALOS will support the following interface connections: ESS. TALOS will interface with ESS for the receipt of HST engineering telemetry in the form of EDBs.

B.1.5.6 Thermal Monitoring System. The most current release of the TMS system will be required to support test activities during SMGT-24. TMS will be required to interface with the ESS for the receipt of HST telemetry thermal data.

B.1.5.7 Project Data Base. The PDB, Release SMDB24, will be used during interface, regression testing, and all SMGT-24 test sessions. **Applicable** PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.1.5.8 Science Planning and Scheduling System. The SPSS, Release **containing Phase 3 commanding**, will be required to support the following interface connections for SMGT-24:
PASS. The OPUS will interface with AEDP for the receipt of engineering data. **The SPSS will interface with PASS to transfer any SMS generated SPC loads and output products.**

B.1.5.9 Packet Processor II. The PACOR II, Release 2.2, located in the SDPF in Building 23, will be required to support test activities during Test Session 2. PACOR II will support the following interface connections: NASCOM and OPUS. The PACOR II will interface with NASCOM for the receipt of science telemetry from the VEST. Once the science data has been processed, the PACOR II will interface with OPUS for the transfer of science data subsets.

B.1.5.10 Simulation Operations Center. The SOC will be required to support activities during SMGT-24. The SOC will be required to interface with the VEST and the HST MOC. The

SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.1.5.11 DF224/COP. The DF224/COP located in the VEST facility will be required to support test activities for SM2 when the NSSC-1 flight software is utilized to support SMGT-24,-25,-27, and -23 tests. The DF224/COP ST flight software (STFS) **release 9.7 or later, including the servicing mission Safing Macro (SMAC)20 load**, provides the Support Systems Module (SSM) Processor Interface Table (PIT) status data to the payload computer, and the SI PIT is sent by the payload computer to the STFS. The timing of the SSM PITs and the receiving of the SI PITs is controlled by the **SI Control and Data Handling (SIC&DH)** Interface software module and is monitored by the SIC&DH Toggle bit. If the SI PIT to the SIC&DH toggle is incorrect, the instrument payloads are safed via Safing Macro (SMAC) 20 and the PIT processing is deactivated.

B.1.5.12 NSSC-1. The NSSC-1 flight software release 6.0 with seven SI support version will be required to support test activities in SM2. The software shall be able to support five of the seven SIs, i.e. **Faint Object Camera (FOC)**, **Faint Object Spectrograph (FOS)** or **NICMOS**, **Goddard High Resolution Spectrograph (GHRS)** or **STIS**, **Corrective Optics Space Telescope Axial Replacement (COSTAR)**, and **WIDE FIELD PLANETARY CAMERA-2 (WFPC-2)**. It shall support switching between FOS-NICMOS, and GHRS-STIS. The NSSC-1 flight software will support SMGT-24, -25, -27,

and -23. tests. The NSSC-1 flight software support of NICMOS and STIS operations will be tested.

B.1.5.13 Space Telescope Imaging Spectrograph. STIS is a second generation HST science instrument. STIS provides 2-dimensional imaging spectroscopy via two Multi-Anode, Microchannel-plate Array (MAMA) detectors and one Charged Coupled Device (CCD). The added two dimensional spectrograph capability covers a much wider wavelength range than the current GHRS and FOS instruments. The STIS hardware and its operational flight software will be a part of SMGT-24 test. The Aliveness test, Functional test, and SMS commanding will be tested. STIS will also support SMGT-27 for SM2 hardware integration and flight launch readiness verification.

B.1.5.14 STIS BESST Release Zero. The **STIS** BESST Release Zero (BRZ), located at the VEST facility in Building 29, will be required to support activities during SMGT-24. The **STIS** BRZ will be required to interface with the VEST structure (including DF224/COP and NSSC-1 computers), and with NASCOM for connection with the HST MOC PRS system. The **STIS** BRZ will provide these interfaces for the receipt of STIS command loads and transmission of memory dumps to the PRS system.

B.1.5.15 Simulator Engineering and Science Tape Recorder The **SIMESTR**, located at the VEST facility in Building 29, will be required to support activities during SMGT-24. The **SIMESTR** will be required to facilitate recording and playback of the science data generated during the STIS FT.

B.1.5.16 Monitor and Science Instrument(s) Simulator
MASIS, located at the VEST facility in Building 29, will be required to support activities during SMGT-24. MASIIS will be required to interface with the NSSC-1 computer.

B.1.6 Duration

Test Run 1 - SMGT-24 DRY RUN - **24** hours
Test Run 2 - SMGT-24 - **24** hours

B.1.7 Dependencies

The dependencies for this test include:

- Delivery of the STIS instrument from BASD. STIS must contain the **embedded** software that will be executed during the AT/FT.
- **Delivery of the STIS BRZ from BASD. The STIS BRZ must contain the embedded software that will be exercised during the AT/FT.**
- **Official release copies of the** Servicing Mission Planning and Replanning Tool (SMPART) generated Servicing Mission Integrated Timeline (SMIT) and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- All SR-3 SM2 upgrades to **the** ground system have been completed and verified.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-24.
- Completion of CODE 442 STIS **activities**.

- **Completion of CODE 442 I&T of STIS BRZ in VEST.**
- All hardware resources listed above need to be available at the time of test execution.
- Successful completion of SMGT-22.
- Science Institute Commanding **SMS.**

B.1.8 Test Schedules

These are the planned dates for SMGT-24 STIS AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

- | | |
|-------------------------------|-------------|
| - Test Plan/Procedure (Draft) | 7/96 |
| - Test Plan/Procedure (Final) | 8/96 |
| - TRR | 8/96 |
| - Test Run 1 Dry Run | 8/96 |
| - Test Run 2 Test | 9/96 |
| - Flash Test Report | 9/96 |
| - Test Report | 9/96 |

B.2 SMGT-25 NICMOS AT/FT COMMAND PLAN VERIFICATION

This section provides detail information on the SMGT-25 NICMOS AT/FT Command Plan Verification.

B.2.1 Purpose

SMGT-25 is a flight hardware test designed to verify the NICMOS AT/FT portion of the command plan for the **SM2** and execute as much of the **ST Sci** commanding and instrument safing as possible in an ambient environment **utilizing SMS**

derived stored command loads in a flight operations manner.

B.2.2 Objectives

- a. To execute the NICMOS Aliveness Test(AT), Functional Test(FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the NICMOS instrument.
- c. To verify the NICMOS/ground system interface.
- d. To execute as much of the Science Institute commanding and instrument safing as possible in an ambient environment
- e. To obtain realistic science data sets in as many modes as possible to verify science data processing software.**
- f. To verify the ground system can deliver the NICMOS science data generated during the FT to the NICMOS Principal Investigator.**

B.2.3 Activities

SMGT-25 will consist of two test sessions, a dry run in which **the NICMOS** BRZ will be used to simulate the NICMOS instrument, and the execution of the test using the **flight** H/W. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test sessions will involve the VEST, STOCC, DOC, **SOC**, **PACOR II**, **ST Sci**, and NASCOM. The tests will execute the NICMOS portion of the command plan using the flight **H/W**. The

command plan will be used as the test plan/procedure **with pre-test set-up and post-test processing added to make it complete**. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and bypassed during the review cycle of the test plan/procedure. The dry run will validate the plan/procedure prior to its execution against the actual NICMOS instrument.

The SMS portion of the test will be executed via stored command loads generated by SPSS and PASS processing. In addition there will be processing of science data through PACOR II, OPUS and HDA.

B.2.4 Roles and Responsibilities

This Section identifies the SMGT-25/NICMOS AT/FT Command Plan Verification support roles and responsibilities. (See Table B-2).

Table B-2. SMGT 25

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|--|---|
| STOCC | PRS PASS, AEDP ESS TALOS, TMS, PDB | LORAL/LMTO ATSC LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| ST Sci | SPSS/PASS/OPUS/HDA | ST Sci |
| SDPF | PACOR II | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, NSSC-1 NICMOS, NICMOS BRZ | GSFC CODE 512 GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 University OF ARIZONA, BASD |

The O&GS SMSE will serve as the test director. The O&GS SMSE responsibilities are:

- overall execution of the test.
- chair the TRR and insure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator. Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT. ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.

- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

Science Institute will provide support for the SMGT. Science Institute responsibilities are:

- attend the TRR.
- provide commanding to be executed in the Commanding and Safing portion of the SMGT.
- **monitor a console during the stored commanding (SMS) portion of the SMGT.**

B.2.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-25 **as listed in Table B-2.**

VEST TEST FACILITY REQUIREMENTS

The test facilities that will be required to support SMGT-25 are the VEST structure with a minimum of the DF-224/COP and NSSC-I computers, **the SIMESTR, the MASIS** and the NICMOS

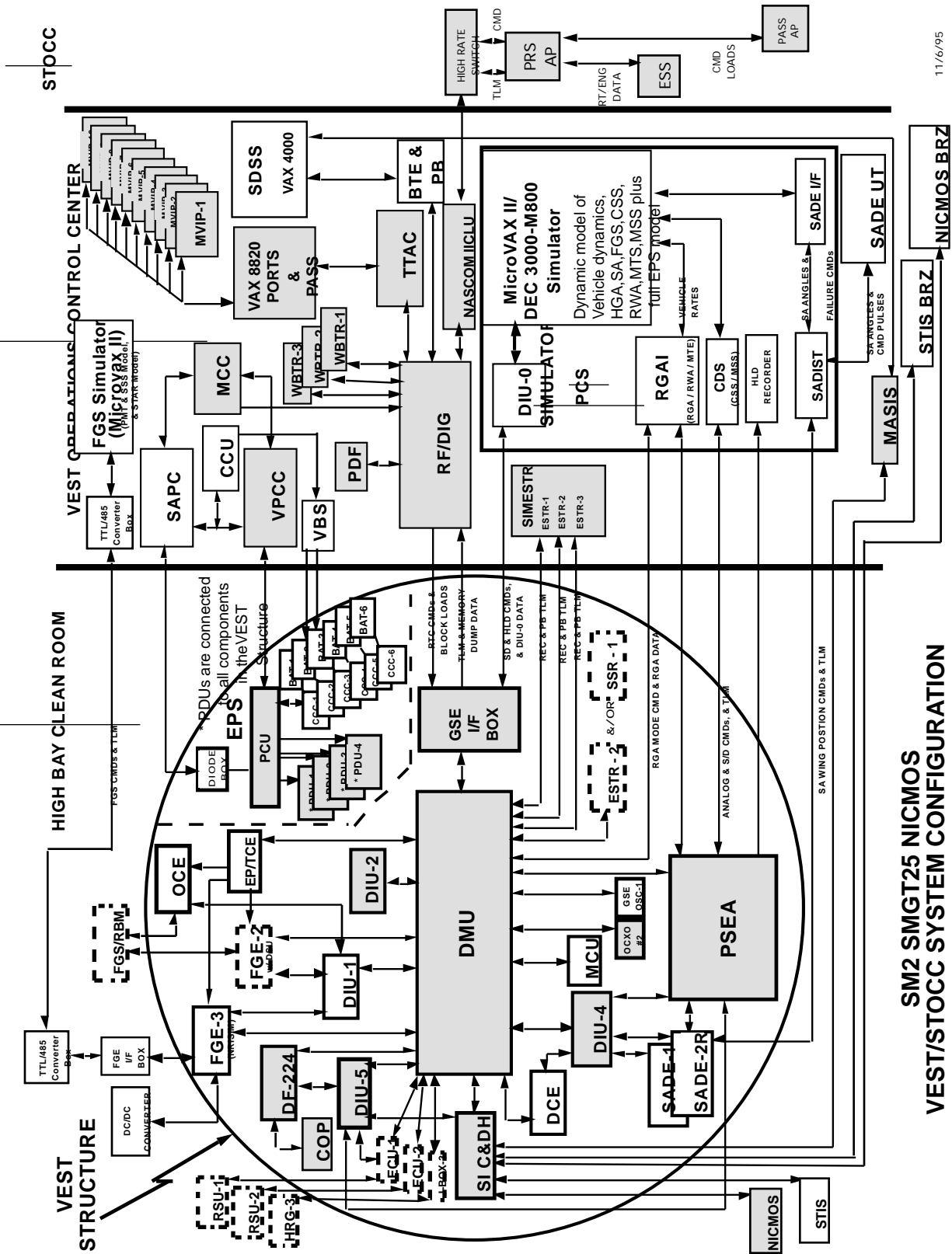


Figure B-2. NICMOS H/W SMGT Overview

instrument. The SMGT-25 configuration is given in Figure B-2. The **NICMOS** BRZ will be used to simulate the NICMOS instrument during the dry run. **The SMGT-25 configuration is given in Figure B-2.**

COMMUNICATION FACILITY REQUIREMENTS

SMGT-25 will simulate the communication links between **GSFC** and **the** HST during the installation of NICMOS. This means SMGT-25 will be conducted in JSC mode. NASCOM, the SOC, **and DCF** will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-25 will be conducted in the SMOR, with DOC support. The MVIPs and printers in the SEER will be required to support this test. A PRS AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed in Table B-2.

SMGT-25 PERSONNEL SUPPORT REQUIREMENTS

SMGT-25 test support will be required by the organizations listed in Table B-2 **and in the roles and responsibilities section.** The O&GS SMSE will serve as the test director. **The** Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES **OST** will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT **by** maintaining the JSC

command link, and trouble shooting any communication problems that may occur during the test. **FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality.** The instrument development team (IDT) from BASD will be required to support the SMGT and insure instrument safety and functionality. The MOSES SI SE will be required to support the test and monitor the execution of the AT/FT **and the SMS.** Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the NICMOS AT/FT **or the appropriate pre and post conditioning commanding as defined in the SM2 Command Plan.**

The following ground system elements will be required to support SMGT-25:

B.2.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-25. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-25: NASCOM (for connection to SOC and the VEST facility), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and imbedded software during the execution of the AT/FT.

B.2.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-25: SPSS, PRS, and AEDP. During SMGT-25, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets. **PASS will interface with OPUS for the transfer of archived engineering data.**

B.2.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 24, will be required to support test activities during SMGT-25. AEDP will support the following interface connections: PASS, ESS, and OPUS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-25. AEDP will interface with ESS and OPUS for the transfer of AEDP magnetic tape products.

B.2.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-25. ESS will support the following interface connections: PRS, AEDP, and OPUS. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.2.5.5 Telemetry Analysis and Logic for Operations Support. The most current release of the TALOS system will be required to support test activities during SMGT-25. TALOS will support the following interface connections: ESS. TALOS will interface with ESS for the receipt of HST engineering telemetry in the form of EDBs.

B.2.5.6 Thermal Monitoring System. The most current release of the TMS system will be required to support test activities during SMGT-25. TMS will be required to interface with the ESS for the receipt of HST telemetry thermal data.

B.2.5.7 Project Data Base. The PDB, Release SMDB24, will be used during interface, regression testing, and all SMGT-25 test sessions. **Applicable** PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.2.5.8 Science Planning and Scheduling System. The SPSS, Release **containing** Phase 3 **commanding**, will be required to support the following interface connections for SMGT-24:
PASS. The OPUS will interface with AEDP for the receipt of engineering data. **The SPSS will interface with PASS to transfer any SMS generated SPC loads and output products.**

B.2.5.9 Packet Processor II. The PACOR II, Release 2.2, located in the SDPF in Building 23, will be required to support test activities during Test Session 2. PACOR II will support the following interface connections: NASCOM and OPUS. The PACOR II will interface with NASCOM for the receipt of science telemetry from the VEST. Once the science data has been processed, the PACOR II will interface with OPUS for the transfer of science data subsets.

B.2.5.10 Simulation Operations Center. The SOC will be required to support activities during SMGT-25. The SOC will be required to interface with the VEST and the HST MOC. The

SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.2.5.11 DF-224/COP. The DF224/COP located in the VEST facility will be required to support test activities for **SM2** when the NSSC-1 flight software is utilized to support SMGT-24, -25, -27, and -23 tests. The DF224/COP STFS release 9.7 or later **including the servicing mission SMAC 20 load**, provides the SSM Processor Interface Table (PIT) status data to the payload computer, and the SI PIT is sent by the payload computer to the STFS. The timing of the SSM PITs and the receiving of the SI PITs is controlled by the SIC&DH Interface software module and is monitored by the SIC&DH Toggle bit. If the SI PIT to the SIC&DH toggle is incorrect, the instrument payloads are safed via SMAC 20 and the PIT processing is deactivated.

B.2.5.12 NSSC-1. The NSSC-1 flight software release 6.0 with seven SI support version will be required to support test activities in SM2. The software shall be able to support five of the seven SIs, i.e. FOC, FOS or NICMOS, GHRS or STIS, COSTAR, **and** WFPC-2. It shall support switching between FOS-NICMOS **and** GHRS-STIS. The NSSC-1 flight software will support SMGT-24, -25, -27, and -23 tests. The NSSC-1 flight software support of STIS and NICMOS operations will be tested.

B.2.5.13 NICMOS. NICMOS is a second generation HST scientific instrument. NICMOS's three cameras cover the near infrared wavelengths which have not been observed by the current HST. It will increase the HST usage to the whole observable spectrum. The NICMOS hardware and its operational flight software will be a part of SMGT-25 test. The Aliveness test, Functional test, and SMS commanding will be tested. **NICMOS will** also support SMGT-27 for SM2 hardware integration and flight launch readiness verification.

B.2.5.14 NICMOS BESST Release Zero. The **NICMOS** BESST Release Zero (BRZ), located at the VEST facility in Building 29, will be required to support activities during **the** SMGT-25 **dry run**. The **NICMOS** BRZ will be required to interface with the VEST structure (including DF224/COP and NSSC-1 computers), and with NASCOM for connection with the HST MOC PRS system. The **NICMOS** BRZ will provide these interfaces for the receipt of STIS and NICMOS command loads and transmission of memory dumps to the PRS system.

B.2.5.15 Simulator Engineering Science Tape Recorder. The SIMESTR, located at the VEST facility in Building 29, will be required to support activities during SMGT-25. The SIMESTR will be required to facilitate recording and playback of the science data generated during the NICMOS FT.

B.2.5.16 Monitor and Science Instruments(s) Simulator. MASIS, located at the VEST facility in Building 29, will be required to support activities during SMGT-25. MASIS will be required to interface with the NSSC-I computer.

B.2.6 Duration

Test Session 1 - SMGT-25 DRY RUN - **24** hours

Test Session 2 - SMGT-25 - **24** hours

B.2.7 Dependencies

The dependencies for this test include:

- Delivery of the NICMOS instrument from BASD.
NICMOS must contain the imbedded software that will be exercised during the AT/FT.
- **Officially released copies of** SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- All SR-3 upgrades to **the** ground system have been completed and verified.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-25.
- Completion of CODE 442 I&T of NICMOS.
- **Completion of 442's NICMOS BRZ I&T.**
- All hardware resources listed above need to be available at the time of test execution.
- Successful completion of SMGT-22.
- **Science Institute Commanding SMS.**

B.2.8 Test Schedules

These are the planned dates for SMGT-25 NICMOS AT/FT Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

| | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 7/96 |
| - Test Plan/Procedure (Final) | 8/96 |
| - TRR | 8/96 |
| - Test Run 1 Dry Run | 8/96 |
| - Test Run 2 Test | 9/96 |
| - Flash Test Report | 9/96 |
| - Test Report | 9/96 |

B.3 SMGT-26 DIU2 AT/FT **and Installation** COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-26 DIU AT/FT Command Plan verification.

B.3.1 Purpose

SMGT-26 is a flight hardware test designed to verify the Data Interface Unit#2 (DIU2) AT/FT portion of the command plan for the Second Servicing Mission.

B.3.2 Objectives

- a. To execute the DIU2 Aliveness Test and Functional Test(**AT/FT**), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the DIU.

B.3.3 Activities

SMGT-26 will consist of two test sessions, a dry run, and the execution of the test using the flight hardware. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test sessions will involve the VEST, STOCC, DOC, and NASCOM. The tests will execute the DIU installation portion as well as the AT/FT portion of the command plan using the flight hardware. The command plan will be used as the test plan/procedure. The command plan will be redlined to **bypass** any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and **bypassed** during the review cycle of the test plan/procedure. The dry run will validate the plan/procedure prior to its execution against the actual DIU replacement unit.

B.3.4 Roles and Responsibilities

This Section identifies the SMGT-26 DIU2 AT/FT and **Installation** Command Plan Verification. See Table B-3 for Roles and Responsibilities.

Table B-3. SMGT-26

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---------------------------|---|
| STOCC | PRS PASS ESS PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF-224/COP DIU | GSFC CODE 512 GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The O&GS SMSE responsibilities are:

- overall execution of the test.
- chair the TRR and insure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator. Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.

- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Tes Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT. ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

B.3.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-26.

VEST TEST FACILITY REQUIREMENTS

The test facilities that will be required to support SMGT-26 are the VEST structure with a minimum of the DF-224/COP computer, DIU2 (**with A and B sides**) and **supporting equipment**. The SMGT-26 configuration is given in Figure B-3.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-26 will simulate the communication links between **GSFC** and HST during the installation of DIU2. This means SMGT-26 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-26 will be conducted in the SMOR, with DOC support. The MVIPs and printers in the SEER will be required to support this test. A PRS AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by MOSES SVG. The STOCC software system requirements are listed above in Table B-3.

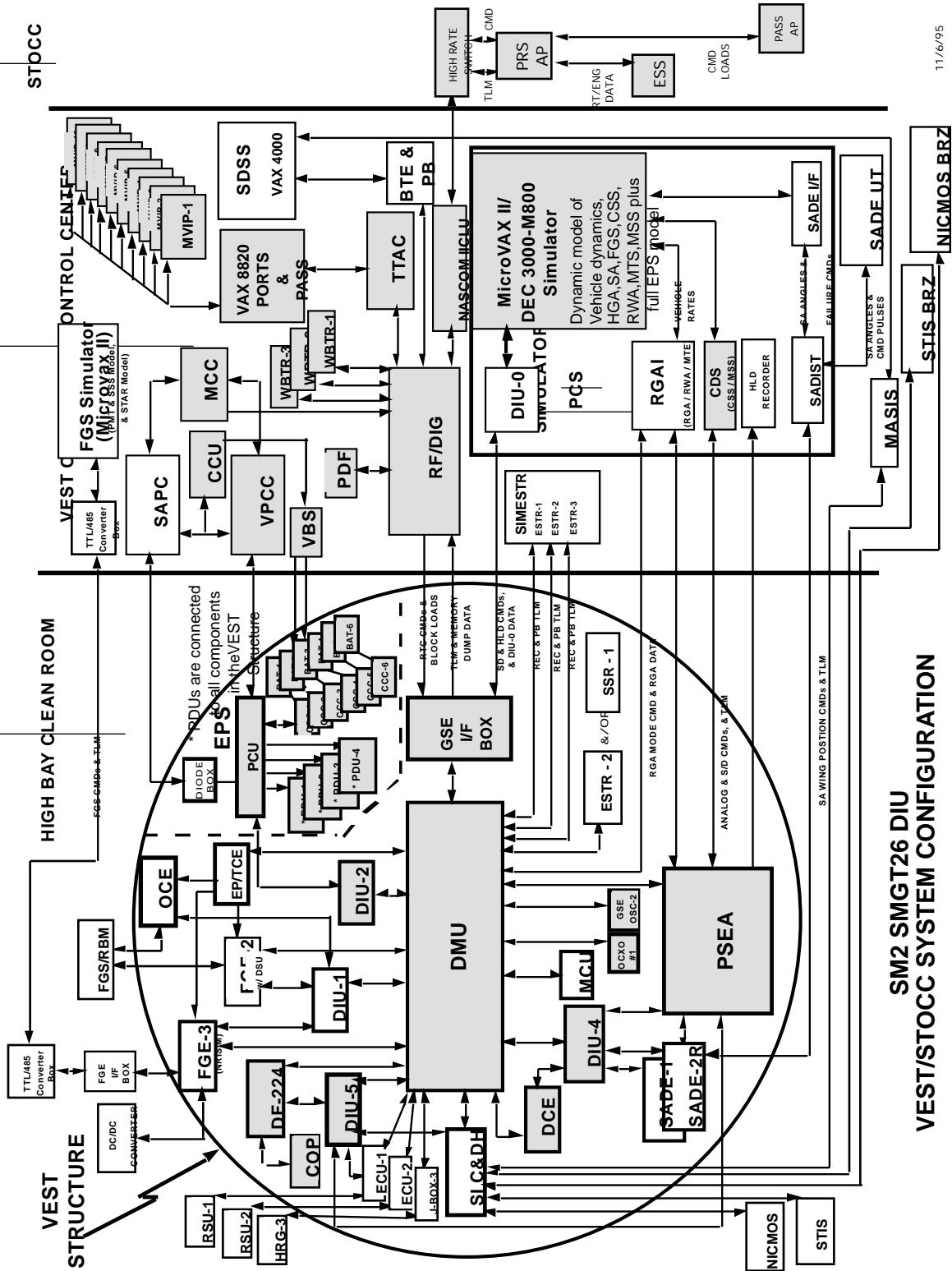


Figure B-3. DIU H/W SMTG Overview

SMGT-26 PERSONNEL SUPPORT REQUIREMENTS

SMGT-26 test support will be required by the organizations listed in Table B-3. The O&GS SMSE will serve as the test director. Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the **Operations Support Team** will **support the test from** the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT **by maintaining** the JSC command link, and trouble shooting any communication problems that may occur during the test. **FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality.** The MOSES **Data Management System (DMS)** SE will be required to support the test and monitor the execution of the AT/FT. Additional MOSES SE (**Pointing Control System (PCS), Electrical Power System (EPS), SI, Instrumentation and Communication (I&C) and Optical Telescope Assembly (OTA)**) support will be required to support any other subsystem commanding **and** verification that is contained in the DIU2 AT/FT.

The following ground system elements will be required to support SMGT-26:

B.3.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-26. PRS will be configured to support command generation and telemetry receipt. PRS will be required to support the following interface connections for SMGT-26: NASCOM (for connection to SOC), PASS and ESS. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will

interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and embedded software during the execution of the AT/FT.

B.3.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-26: OPUS, PRS, and AEDP. During SMGT-26, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets.

B.3.5.3 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-26. ESS will support the following interface connections: PRS, **and** AEDP. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.3.5.4 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-26 test sessions. **Applicable** PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.3.5.5 Simulation Operations Center. The SOC will be required to support activities during SMGT-26. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of

spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.3.5.6 DF-224. The DF224/COP located in the VEST facility will be required to support test activities for SM2. The DF224/COP STFS release 9.6 or later as required.

B.3.5.7 Data Interface Unit. SM2 includes replacing the failed DIU2 with a new DIU. All SSM telemetry reporting redundancy will be restored with replacement of the new DIU. The DIU2, **pre and post conditioning, Extra-Vehicular Activity (EVA)** procedures, Aliveness test, and Functional test will be part of SMGT-26 test. It will also support SMGT-27 for SM2 hardware integration and flight launch readiness verification.

B.3.6 Duration

| | |
|----------------------------------|------------|
| Test Session 1 - SMGT-26 DRY RUN | - 12 hours |
| Test Session 2 - SMGT-26 | - 12 hours |

B.3.7 Dependencies

The dependencies for this test include:

- Delivery of the DIU.
- SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the

actual flight version as is possible. This should be available in softcopy.

- All SR-3 SM upgrades to ground system have been completed and verified.
- Level 2 certified PDB that contains all commands that will be executed in SMGT-26.
- Completion of Code 442 I&T of the DIU.
- All hardware resources listed above need to be available at the time of test execution.
- Successful completion of SMGT-22.

B.3.8 Test Schedules

These are the planned dates for SMGT-26 **DIU** AT/FT and **Installation** Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

- | | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 5/96 |
| - Test Plan/Procedure (Final) | 6/96 |
| - TRR | 6/96 |
| - Session 1 Test Dry Run | 6/96 |
| - Session 1 Test | 6/96 |
| - Flash Test Report | 6/96 |
| - Test Report | 7/96 |

B.4 SMGT-27/INTEGRATED H/W TEST

This Section provides detail information on the SMGT-27/Integrated H/W AT/FT Command Plan Verification.

B.4.1 Purpose

SMGT-27 is a flight hardware test designed to verify the EVA portion of the SM2 command plan for **all ORUs and ORIs** installed in SM2.

B.4.2 Test Objectives

- a. To execute, in end-to-end fashion, the SM2 command plan that involves the installation of **all ORUs and ORIs**.
- b. To verify the ground system can support the execution of the SM2 EVAs **including delivery of NICMOS and STIS science data to the NICMOS and STIS principal investigators (method TBR)**.
- c. To verify the command plan flow and commanding.

B.4.3 Activities

SMGT-27 will consist of two test sessions, a dry run, and the execution of the test using the flight hardware. The test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test sessions will involve the VEST, ST OCC, **ST Sci**, **PACOR II**, DOC, SOC, and NASCOM. The tests will execute the EVA portion of the command plan using all available flight hardware. The command plan will be used as the test plan/procedure. The command plan will be redlined to **bypass** any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and **bypassed** during the review cycle of the test plan/procedure. The dry run will validate the plan/procedure

prior to its execution against the actual DIU replacement unit.

SMGT-27 will execute as many of the hardware sequences in the command plan as possible. The initial VEST configuration will simulate the servicing mission prior to HST grapple. The command plan will then be executed from preparations to grapple until HST release. Several communication modes will be simulated as the command plan is executed. All EVA activities will be executed using flight hardware. The test will conclude with verification of successful HST release.

B.4.4 Roles and Responsibilities

This Section identifies the SMGT-27/Integrated H/W AT/FT Command Plan Verification support roles and responsibilities. (See Table B-4).

Table B-4. SMGT 27

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---|---|
| STOCC | PRS PASS, AEDP ESS TALOS, TMS, PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| ST Sci | SPSS/PASS/OPUS/HDA | ST Sci |
| SDPF | PACOR II | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF-224, NSSC-1 NICMOS, STIS, DIU | GSFC CODE 512 GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 GSFC CODE 680 University OF ARIZONA, BASD |

The O&GS SMSE will serve as the test director. The O&GS SMSE responsibilities are:

- overall execution of the test.
- chair the TRR and insure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.
Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442
VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT.

ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

Science Institute will provide support for the SMGT. Science Institute responsibilities are:

- attend the TRR.
- **monitor a console during that portion of the SMGT that is relevant to the Science Institute.**

B.4.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-27.

VEST TEST FACILITY REQUIREMENTS

The test facilities that will be required to support SMGT-27 are The VEST structure with a minimum of the DF-224 and NSSC-I

computers, **the SIMESTR, MASIS**, and available flight hardware. If particular flight hardware is not available to support this SMGT, it will be simulated using the appropriate VEST simulator. The SMGT-27 configuration is given in Figure B-4.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-27 will simulate the communication links between **GSFC** and HST during the EVA portion of SM2. This means SMGT-27 will be conducted in JSC mode. NASCOM, the SOC **and SDPF (PACOR II)** will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

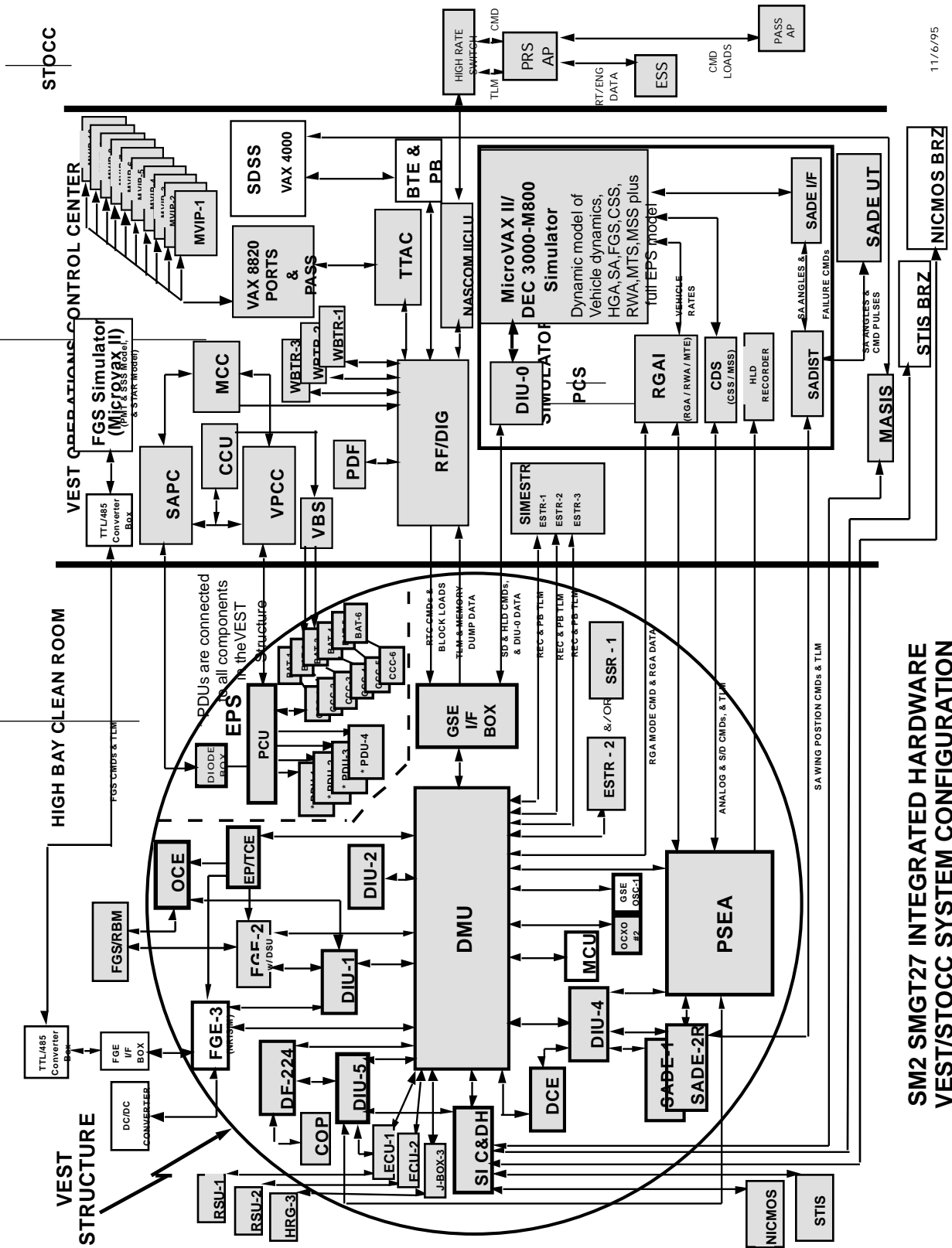


Figure B-4. SMGT-27 H/W SMGT Overview

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-27 will be conducted in the SMOR, with DOC support. The MVIPs and printers in the SEER will be required to support this test. A PRS AP, TTAC and high rate switch will also be required

to support this test. These resources will be scheduled prior to test start by MOSES SVG. The STOCC software system requirements are listed above in Table B-4.

SMGT-27 PERSONNEL SUPPORT REQUIREMENTS

SMGT-27 test support will be required by the organizations listed in Table B-4 **and in the roles and responsibility section**. The O&GS SMSE will serve as the TEST director. Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the **OST will support the test from** the consoles in the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT **by maintaining** the JSC command link, and trouble shooting any communication problems that may occur during the test. **FS&S (Code 442) and IDT will be required to support the SMGT and ensure ORU safety and functionality**. The instrument developers from BASD will be required to support the SMGT and insure instrument safety and functionality. The MOSES SI, **DMS, OTA, I&C, EPS and PCS SEs** will be required to support the test and monitor the execution of the AT/FT **including** any subsystem commanding that is contained in the **NICMOS, STIS, DIU2, SSR, ESTR, SADE, FGS and RGA1 and 3 AT/FT and testing**.

The following ground system elements will be required to support SMGT-27:

B.4.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-27. PRS will be configured to support command generation and telemetry receipt **and dump processing**. PRS will be required to support the following interface connections for SMGT-27: NASCOM (for connection to SOC and the VEST), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry.

B.4.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-27: SPSS, PRS, and AEDP. During SMGT-27, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets.

B.4.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 24, will be required to support test activities during SMGT-27. AEDP will support the following interface connections: **PASS and ESS**. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-27. AEDP will interface with ESS for the transfer of AEDP magnetic tape products.

B.4.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-27. ESS will support the following interface connections: **PRS, and AEDP**. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.4.5.5 Telemetry Analysis and Logic for Operations Support. The most current release of the TALOS system will be required to support test activities during SMGT-27. TALOS will support the following interface connections: ESS. TALOS will interface with ESS for the receipt of HST engineering telemetry in the form of EDBs.

B.4.5.6 Thermal Monitoring System. The most current release of the TMS system will be required to support test activities during SMGT-27. TMS will be required to interface with the ESS for the receipt of HST telemetry thermal data.

B.4.5.7 Project Data Base. The PDB, Release SMDB24, will be used during interface, regression testing, and all SMGT-27 test sessions. **Applicable** PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.4.5.8 Packet Processor II. The PACOR II, Release 2.2., located in the SDPF in Building 23, will be required to support test activities during Test Session 2. PACOR II will support the following interface connections: NASCOM. The PACOR II will

interface with NASCOM for the receipt of science telemetry from the VEST.

B.4.5.9 Simulation Operations Center. The SOC will be required to support activities during SMGT-27. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.4.5.10 Data Interface Unit. SM2 includes replacing the failed DIU-2 with a new DIU. All SSM telemetry reporting redundancy will be restored with the replacement of the new DIU. The DIU EVA procedures, Aliveness test, and Functional test will be part of SMGT-26 test. It will also support SMGT-27 for SM2 hardware integration and flight launch readiness verification.

B.4.5.11 NICMOS. NICMOS is a second generation HST science instrument. NICMOS's three cameras will cover the near infrared wavelengths which have not been observed by the current HST. It will increase the HST's usage to the whole observable spectrum. The NICMOS hardware and its operational flight software will be a part of SMGT-25 test. The Aliveness test, Functional test, and SMS commanding will be tested. **NICMOS** will also support SMGT-27 for SM2 hardware integration and flight launch readiness verification.

B.4.5.12 Space Telescope Imaging Spectrograph. STIS is a second generation HST science instrument. STIS provides 2-dimensional imaging spectroscopy via two Multi-Anode, Microchannel-plate Array (MAMA) detectors and one Charged Coupled Device (CCD). The added two dimensional spectrograph capability covers a much wider wavelength range than the current GHRS and FOS instruments. The STIS hardware and its operational flight software will be a part of SMGT-24 test. The Aliveness test, Functional test, and SMS commanding will be tested. STIS will also support SMGT-27 for SM2 hardware integration and flight launch readiness verification.

B.4.5.13 DF-224/COP. The DF224 Rockwell computer and 80386 Coprocessor located in the VEST facility will be required to support test activities for SM2 when the NSSC-1 flight software is utilized to support SMGT testing. The DF224/COP STFS release **9.7** or later **including the servicing mission SMAC20 load, as required.**

B.4.5.14 NSSC-1. The NSSC-1 flight software release 6.0 with seven SI support version will be required to support test activities in SM2. The software shall be able to support five of the seven SIs, i.e. FOC, FOS or NICMOS, GHRS or STIS, COSTAR, and WFPC-2. It shall support switching between FOS-NICMOS, **and** GHRS-STIS. The NSSC-1 flight software will support **SMGT-27 test**. The NSSC-1 flight software support of STIS and NICMOS operations will be tested.

B.4.5.15 Science Data Processing Facility. The SDPF, **Which contains the PACOR II and DDF, will be required to support the following interface connection for SMGT-27: Science Data. SDPF will be required to**

support data quality analysis of the science fill data generated during the SSR and ESTR AT/FTs.

B.4.5.16 Simulator Engineering and Science Tape Recorder. The SIMESTR, located at the VEST facility in Building 29 will be required to support activities during SMGT-27. The SIMESTR will be required to facilitate recording and playback of the science data generated using the STIS and NICMOS FTs.

B.4.5.17 Monitor and Science Instrument(s) Simulator. MASIS, located at the VEST facility in Building 29, will be required to support activities during SMGT-27. MASIS will be required to interface with the NSSC-1 computer.

B.4.6 Duration

Test Session - SMGT-27 - **12 hours**

B.4.7 Dependencies

The dependencies for this test include:

- SMPART generated SMIT and command plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- All SR-3 SM2 upgrades to ground system have been completed and verified.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-27.

- Completion of CODE 442 I&T of the all flight hardware.
- All hardware resources listed above need to be available at the time of test execution.
- Successful completion of SMGT-22, -24, -25, -26, -30, -31, -32, -34 AND -36.

B.4.8 Test Schedules

These are the planned dates for SMGT-27 **Integrated Hardware Test** (EVA Command Plan Verification activities), based on the most recent version of the O&GS Project Schedule.

- | | |
|-------------------------------|-------|
| - Test Plan/Procedure (Draft) | 9/96 |
| - Test Plan/Procedure (Final) | 10/96 |
| - TRR | 10/96 |
| - Session 1 Test | 10/96 |
| - Flash Test Report | 10/96 |
| - Test Report | 11/96 |

B.5 SMGT-29 SADE 2R AT/FT COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-29/SADE 2R AT/FT Command Plan Verification.

B.5.1 Purpose

SMGT-29 is a flight H/W test designed to verify the SADE 2R Aliveness Test/Functional Test (AT/FT) portion of the command plan for the SM2.

B.5.2 Objectives

- a. To execute the SADE 2R (AT/FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the SADE 2R instrument.
- c. To verify the SADE 2R/ground system interface.
- d. Verify HST O&GS Project Level 3 and 4 requirements specifically mapped to the SMGT-29 SADE 2R aliveness/functional test.

B.5.3 Activities

SMGT-29 will consist of two test sessions. The first session will be used as a dry run to check procedures and activities. The second session will be the formal execution of the test utilizing the SADE flight hardware. The test run(s) will involve the Vehicle Electrical Systems Test (VEST), Space Telescope Operational Control Center (STOCC), Data Operations Center (DOC), Simulation Operations Center (SOC), PASS Operations (PASSOPS), Engineering Support System (ESS), and NASA Communications (NASCOM). The dry run test will execute the SADE 2R portion of the command plan using the EM SADE while the formal test will execute the SADE 2R portion of the command plan using the flight hardware (H/W). The command plan generated from the SMPART will be used as the test procedure. Pre-test set-up and post-test processing steps will be added to complete the plan. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test environment. These sequences will be identified and noted for exclusion during the review cycle of the test procedure.

The dry run will validate the plan/procedure prior to its execution against the actual SADE 2R. The formal test session will ensure that all SM2 test objectives and requirements covered by this SMGT are verified.

B.5.4 Roles and Responsibilities

This Section identifies the SMGT-29/SADE 2R AT/FT Command Plan Verification support roles and responsibilities. (See Table B-1).

Table B-1. SMGT-29

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|--------------------|---------------------------------------|
| STOCC | PRS ESS PDB | LORAL/LMTO LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SOC | MCC SIMULATOR | ATSC |
| VEST | DF224/COP, SADE 2R | GSFC CODE 512 GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.

- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.
Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.

- IDT support.

ITAV will provide communications support during the SMGT.

ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES off-line team test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

B.5.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-29 as listed in Table B-5.

VEST TEST FACILITY REQUIREMENTS

The VEST facility requirements to support SMGT-29 are the Rockwell digital 2's complement 24-bit computer (DF-224)/Coprocessor (COP) and the SADE 2R. The SMGT-29 configuration is given in Figure B-5.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-29 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-5.

SMGT-29 PERSONNEL SUPPORT REQUIREMENTS

SMGT-29 test support will be required by the organizations listed in Table B-1, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. Lead Organization will serve as the Test Coordinator. VEST

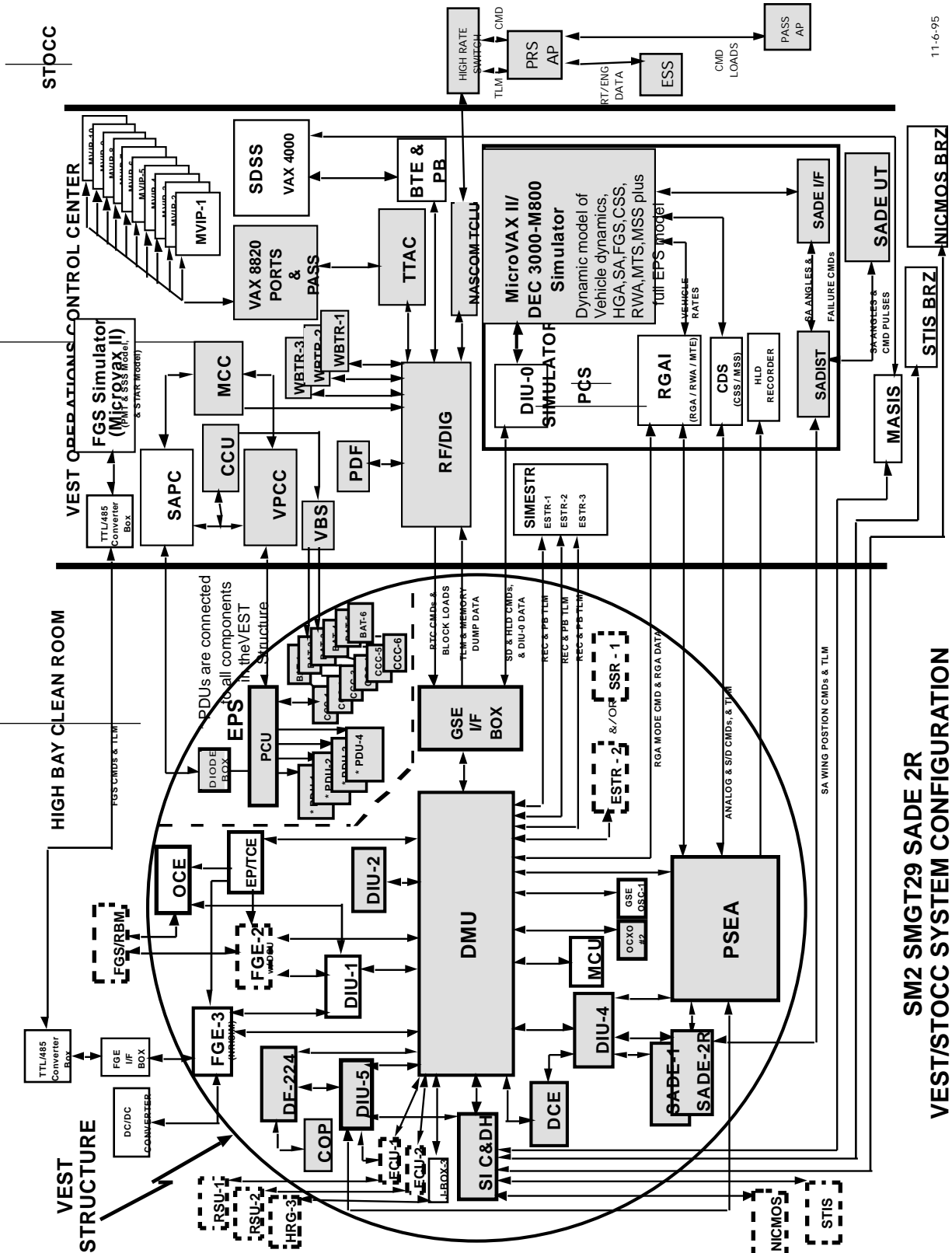


Figure B-5. SADE 2R H/W SMTG Overview

personnel will support the SMGT from Building 29, and the MOSES **OST** will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality. The MOSES EPS SE will be required to support the test and monitor the execution of the AT/FT. Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the SADE 2R AT/FT.

The following ground system elements will be required to support SMGT-29:

B.5.5.1 PORTS Refurbishment System. The PRS system, Release 7.T, will be required to support test activities in 4-29. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-29: NASCOM (for connection to SOC and the VEST hardware), ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and On Board Computer (OBC) loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and embedded software during the execution of the AT/FT.

B.5.5.2 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-29. ESS will support the following interface connections: PRS. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes.

B.5.5.3 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-29 test sessions. Applicable PDB files will be validated Level II Certified and signed-off by MOSES SVG personnel and IDTs prior to test execution.

B.5.5.4 DF224/COP. The DF224/COP located in the VEST facility will be required to support test activities for SM2 SMGT-29. The primary function of the DF-224/COP will be to execute the SADE 2R functional test which will run the Flight software and to execute the SERMSPC MACRO number 13 to rotate the solar arrays from zero degrees to ninety degrees.

B.5.6 Duration

| | |
|----------------------------------|------------|
| Test Run 1 - SMGT-29 Dry Run | - 12 hours |
| Test Run 2 - SMGT-29 Formal Test | - 12 hours |

B.5.7 Dependencies

The dependencies for this test include:

- Delivery of the SADE 2R instrument to the VEST
- Official released copies of SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- All SR-3 SM upgrades to ground system have been completed, verified and installed in the test facilities.
- Level 2 certified Project Data Base (PDB) that contain all commands that will be executed in SMGT-29.

- Completion of CODE 442 I&T of SADE 2R.
- All hardware resources listed above need to be available at the time of test execution.
- Ground systems requirements (SR2) are completed via SMGT-21.
- Generation of SERMSPC Macro Loads and support SERMSPC PSTOL. Loads will be validated by SE/SVG and loaded on to the test system via tape to file transfer.

B.5.8 Test Schedules

These are the planned dates for SMGT-29/SADE 2R AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

| | |
|-------------------------------|-------|
| - Test Plan/Procedure (Draft) | 10/95 |
| - Test Plan/Procedure (Final) | 10/95 |
| - TRR | 11/95 |
| - Test Run 1 Dry Run | 11/95 |
| - Test Run 2 Formal Test | 11/95 |
| - Flash Test Report | 12/95 |
| - Test Report | 12/95 |

B.6 SMGT-30/ESTR AT/FT COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-30/ESTR AT/FT Command Plan Verification.

B.6.1 Purpose

SMGT-30 is a flight H/W test designed to verify the ESTR Aliveness Test/Functional Test (AT/FT) portion of the command plan for the Second Servicing Mission.

B.6.2 Objectives

- a. To execute the ESTR (AT/FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the ESTR instrument.
- c. To verify the ESTR/ground system interface.

B.6.3 Activities

SMGT-30 will consist of two test runs, a dry run in which the SIMESTR will be used to simulate the ESTR instrument, and the execution of the formal test using the flight H/W. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test runs will involve the VEST, STOCC, DOC, SOC, SDPF and NASCOM. The tests will execute the ESTR portion of the command plan using the H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure. The dry run will validate the

plan/procedure prior to its execution against the actual ESTR instrument.

B.6.4 Roles and Responsibilities

This Section identifies the SMGT-30/ESTR AT/FT and Command Plan Verification support roles and responsibilities. (See Table B-6).

Table B-6. SMGT-30

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|--|---|
| STOCC | PRS PASS, AEDP ESS PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SDPF | PACOR II | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, NSSC-1 ESTR, BRZ SIMULATOR | GSFC CODE 512 GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.

- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.

Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT.

ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

Science Institute will provide support for the SMGT. Science Institute responsibilities are:

- attend the TRR.

B.6.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-30 as listed in Table B-6.

VEST TEST FACILITY REQUIREMENTS

The VEST facility requirements to support SMGT-30 are DF-224 /COP, NASA Standard Spacecraft Computer (NSSC) I, and the ESTR. The SIMESTR will be used to simulate the ESTR instrument during the dry run. The SMGT-30 configuration is given in Figure B-6.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-30 will simulate the communication links between GSFC and HST during the installation of ESTR. This means SMGT-30 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

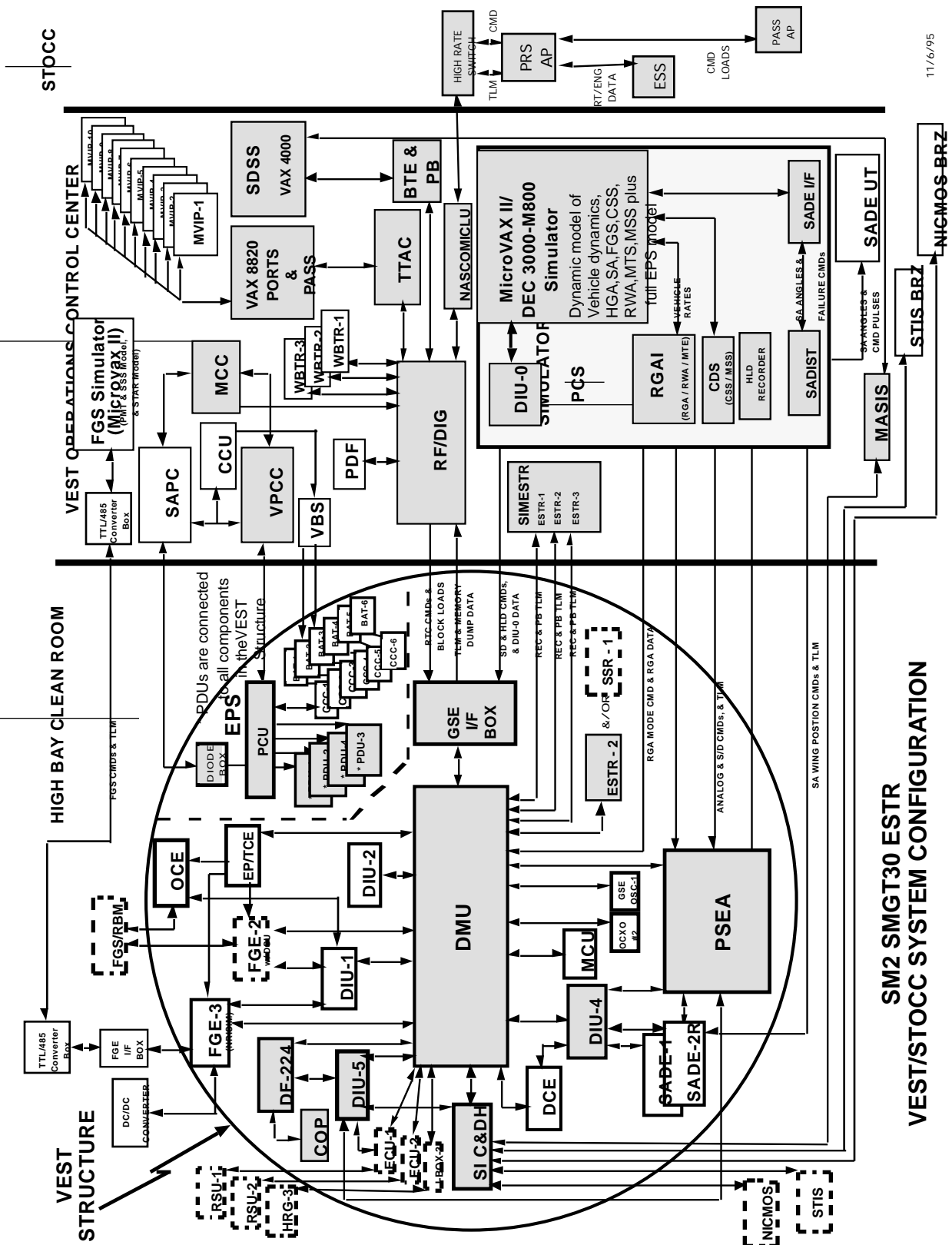


Figure B-6. ESTR H/W SMTG Overview

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-30 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-6.

SMGT-30 PERSONNEL SUPPORT REQUIREMENTS

SMGT-30 test support will be required by the organizations listed in Table B-6, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES off-line team will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT by maintaining the JSC command link, and trouble shooting any communication problems that may occur during the test. FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality. The MOSES DMS SE will be required to support the test and monitor the execution of the AT/FT. Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the ESTR AT/FT.

The following ground system elements will be required to support SMGT-30:

B.6.5.1 PORTS Refurbishment System. The PRS system, Release 8.0 or later, will be required to support test activities in SMGT-30. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-30: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and embedded software during the execution of the AT/FT.

B.6.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-30: PRS, and AEDP. During SMGT-30, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets.

B.6.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 24, will be required to support test activities during SMGT-30. AEDP will support the following interface connections: PASS, and ESS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-

30. AEDP will interface with ESS for the transfer of AEDP magnetic tape products.

B.6.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-30. ESS will support the following interface connections: PRS, and AEDP. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.6.5.5 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-30 test sessions. A portion of the PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.6.5.6 Packet Processor II. The PACOR II, Release 2.2, located in the SDPF in Building 23, will be required to support test activities during Test Session 2. PACOR II will support the following interface connections: NASCOM and OPUS. The PACOR II will interface with NASCOM for the receipt of science fill data from the VEST. Once the science fill data has been processed the DCF will inform operations in the SMOR of the data quality statistics.

B.6.5.7 Simulation Operations Center. The SOC will be required to support activities during SMGT-30. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of

JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.6.5.8 DF224/COP. The DF224/COP located in the VEST facility will be required to support test activities for SM2 **in** SMGT-30 test. The DF-224 supports the nominal commanding for the ESTR 2R installation and supports use of the Recorder Playback Arrays to command ESTR 2R playbacks.

B.6.5.9 NSSC-1. The NSSC-1 Flight Software Release 6.0 with seven SI support version will be required to support test activities in SM2. The NSSC-1 is required to provide science fill data to the DMS for recording to the ESTR. No SI SEs are required for the support of this test.

B.6.5.10 SIMESTR. The SIMESTR located in the VEST facility will be required to support test activities for SM2 SMGT-30 test. The SIMESTR will need to model ESTR 3 and ESTR 2 in the dry run and ESTR 3 in the actual test run. In the dry run the SIMESTR modeling ESTR 2 will be required to playback the data captured during the test.

B.6.5.11 ESTR-2R. The ESTR-2R, ESTR 2 Replacement, in the VEST facility will be required to support test activities for SM2 SMGT-30. The ESTR-2R will be available for use during the actual test run and it is not required to support the dry run. In the actual test run ESTR-2R will be required to playback the data captured during the test.

B.6.6 Duration

Test Run 1 - SMGT-30 Dry Run - 12 hours
Test Run 2 - SMGT-30 Formal Test - 12 hours

B.6.7 Dependencies

The dependencies for this test include:

- Delivery of the ESTR instrument from ODETICS.
- Official release copies of the SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-30.
- Completion of CODE 442 I&T of ESTR 2R.
- All hardware resources listed above need to be available at the time of test execution.

B.6.8 Test Schedules

These are the planned dates for SMGT-30/ESTR AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

| | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 2/96 |
| - Test Plan/Procedure (Final) | 2/96 |
| - TRR | 2/96 |
| - Test Run 1 Dry Run | 2/96 |
| - Test Run 2 Test | 3/96 |
| - Flash Test Report | 3/96 |
| - Test Report | 4/96 |

B.7 SMGT-31 RGA 1 AT/FT COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-31/RGA AT/FT and Command Plan Verification.

B.7.1 Purpose

SMGT-31 is a flight H/W test designed to verify the RGA Aliveness Test/Functional Test (AT/FT) portion of the command plan for the Second Servicing Mission

B.7.2 Objectives

- a. To execute the RGA (AT/FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the RGA

B.7.3 Activities

SMGT-31 will consist of two test runs, a dry run and the execution of the test using the flight H/W. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test runs will involve the VEST, STOCC, DOC, SOC, and NASCOM. The tests will execute the RGA portion of the command plan using the H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot

be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure. The dry run will validate the plan/procedure prior to its execution against the actual RGA hardware.

B.7.4 Roles and Responsibilities

This Section identifies the SMGT-31/RGA AT/FT Command Plan Verification support roles and responsibilities. (See Table B-7).

Table B-7. SMGT-31

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---------------------------------|---|
| STOCC | PRS PASS, AEDP ESS PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, RGA | GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.

- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.

Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- IDT support.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.

ITAV will provide communications support during the SMGT.

ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES OST will provide support during the SMGT. MOSES OST test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

B.7.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-31 as listed in Table B-7.

VEST TEST FACILITY REQUIREMENTS

The VEST facility requirements to support SMGT-31 are the Rockwell digital 2's complement 24-bit computer (DF-224)/Coprocessor (COP) and the RGA hardware. The SMGT-31 configuration is given in Figure B-7.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-31 will simulate the communication links between GSFC and HST during the installation of RGA. This means SMGT-31 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

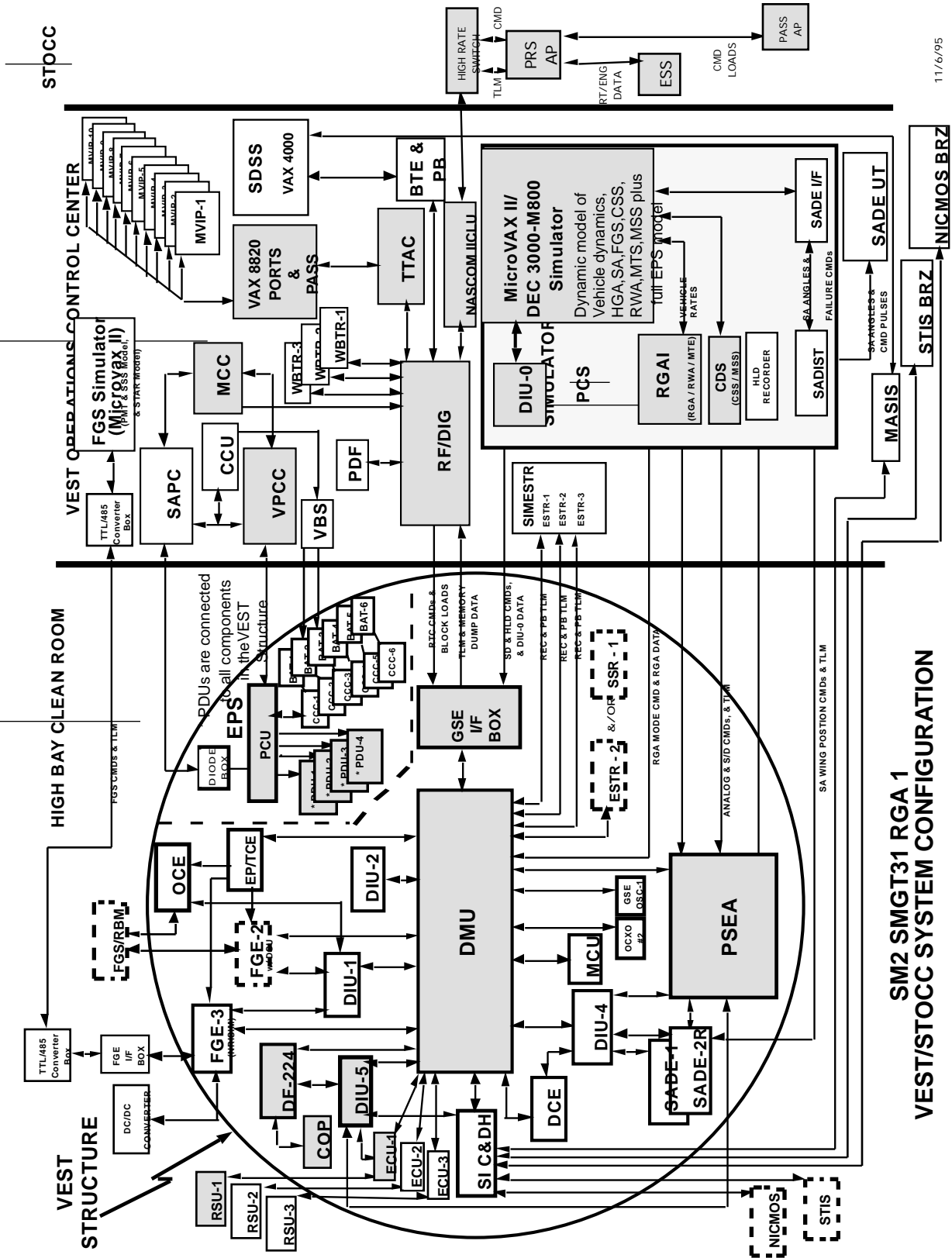


Figure B-7. RGA H/W SMGT Overview

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-31 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-7.

SMGT-31 PERSONNEL SUPPORT REQUIREMENTS

SMGT-31 test support will be required by the organizations listed in Table B-1, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. MOSES SVG will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES OST will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT by maintaining the JSC command link, and trouble shooting any communication problems that may occur during the test. FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality. The MOSES SE will be required to support the test and monitor the execution of the AT/FT. Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the RGA AT/FT.

The following ground system elements will be required to support SMGT-31:

B.7.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-31. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-31: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering tele-metry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry.

B.7.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-31: PRS, and AEDP. During SMGT-31, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets.

B.7.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 24, will be required to support test activities during SMGT-31. AEDP will support the following interface connections: PASS, and ESS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-31.

B.7.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-31. ESS will support the following interface connections: PRS, and AEDP. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.7.5.5 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-31 test sessions. Applicable PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.7.5.6 Simulation Operations Center. The SOC will be required to support activities during SMGT-31. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.7.5.7 DF224/COP. The DF224/COP located in the VEST facility will be required to support test activities for SM2.

B.7.6 Duration

Test Run 1 - SMGT-31 DRY RUN - 12 hours
Test Run 2 - SMGT-31 - 12 hours

B.7.7 Dependencies

The dependencies for this test include:

- Delivery of the RGA hardware from Allied-Signal
- Official release copies of the SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-31.
- Completion of CODE 442 I&T of RGA.
- All hardware resources listed above need to be available at the time of test execution.

B.7.8 Test Schedules

These are the planned dates for SMGT-31/RGA AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

- | | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 2/96 |
| - Test Plan/Procedure (Final) | 2/96 |
| - TRR | 3/96 |
| - Test Run 1 Dry Run | 3/96 |
| - Test Run 2 Test | 8/96 |
| - Flash Test Report | 3/96 |
| - Test Report | 4/96 |

B.8 SMGT-32/SSR AT/FT COMMAND PLAN AND SMOV VERIFICATION

This Section provides detail information on the SMGT-32/SSR AT/FT Command Plan and SMOV Verification.

B.8.1 Purpose

SMGT-32 is a flight H/W test designed to verify the SSR Aliveness Test/Functional Test (AT/FT) portion of the command plan for the Second Servicing Mission and execute as much of the SMOV commanding for the three different operational configurations as possible in an ambient environment. This test will consist of three parts, each of which will be used to test a different operational configuration of the SSRs and ESTRs. Only two of these three tests will execute the two possible SSR installation AT/FT scenarios.

B.8.2 Objectives

- a. To execute both the SSR AT/FTs, for installation into either ESTR slot (1 or 2), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan and Alternate Command Plan (ACP).
- b. To execute SMS sequences for the three possible operational configurations for validation of the PASS changes required for SSR support and to verify that the ground system can support installation and operation of the SSR.
- c. To verify the SSR/ground system interface.

B.8.3 Activities

SMGT-32 will consist of two dry runs and three test runs. The dry runs will be used to exercise the test script prior to commanding the Flight Unit. No SMS execution will be performed in the dry runs. Two of the test runs will incorporate both the AT/FT commanding and the SMS execution into the same test. The remaining test run will execute an SMS only. No AT/FT commanding will be executed. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test sessions will be broken into three parts which will be executed on different days.

Part 1: SSR Slot 1 Sci/Eng

- AT/FT SSR Slot 1/ESTR 2 in slot 3.
- Execute an SMS which uses the SSR in slot 1 for both science and engineering data capture.
- Paper validation of SMS commanding.
- Pointing Control and Safemode Electronics Assembly (PSEA) Safemode Verification with the SSR as the Safemode Recorder.
- Exercising S/W and H/W Safemode

Part 2: SSR Slot 1 Sci/ESTR 2 Eng

- Execute an SMS which uses the SSR in slot 1 for science data capture and SIMESTR in slot 2 for engineering data capture.
- No AT/FT or Safemode Execution.
- Paper validation of SMS commanding.

Part 3: SSR Slot 2

- AT/FT SSR Slot 2
- Execute an SMS which uses the SSR in slot 2 for science data capture and ESTR in slot 3 for engineering data capture.
- Paper validation of SMS commanding.

The test runs will involve the VEST, STOCC, DOC, SOC, SDPF and NASCOM. The tests will execute the SSR portion of the command plan using the H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure. The dry run will validate the AT/FT commanding plan/procedure prior to its execution against the actual SSR instrument.

B.8.4 Roles and Responsibilities

This Section identifies the SMGT-32/SSR AT/FT Command Plan and SMOV Verification support roles and responsibilities. (See Table B-8).

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.

Table B-8. SMGT-32

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|--|---|
| STOCC | PRS PASS, AEDP ESS PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| ST ScI | SPSS/PASS/OPUS/HDA | ST ScI |
| SDPF | PACOR II | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, NSSC-1 SSR, BRZ SIMULATORs | GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.

Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.

- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT. ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the tests.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.

- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

Science Institute will provide support for the SMGT. Science Institute responsibilities are:

- attend the TRR.
- provide test SMS with the appropriate commanding.

B.8.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-32 as listed in Table B-8.

VEST TEST FACILITY REQUIREMENTS

The VEST facility requirements to support SMGT-32 are the DF-224/Coprocessor (COP) Flight Computers, the NSSC-I Payload Computer, and the SSR units. The SSR ETU will be used to simulate the SSR instrument during the dry run. The SMGT-32 configurations are given in Figure B-8, B-9 and B-10.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-32 will simulate the communication links between GSFC and HST during the installation of SSR. This means SMGT-32 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-32 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-1.

SMGT-32 PERSONNEL SUPPORT REQUIREMENTS

SMGT-32 test support will be required by the organizations listed in Table B-8, and in the roles and responsibility section. The O&GS SMSE will serve as the test director.

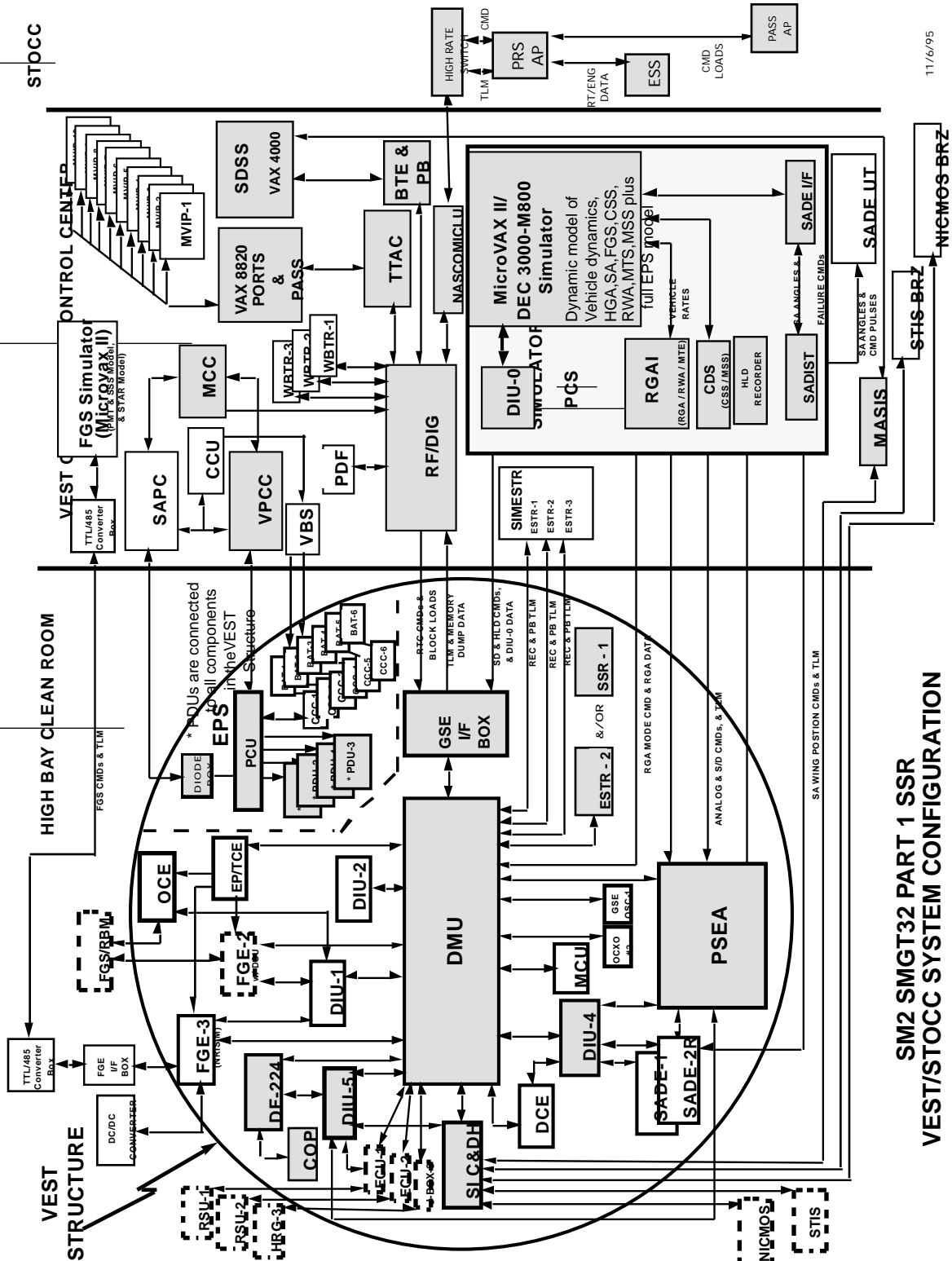


Figure B-8. PART 1 SSR H/W SMGT Overview

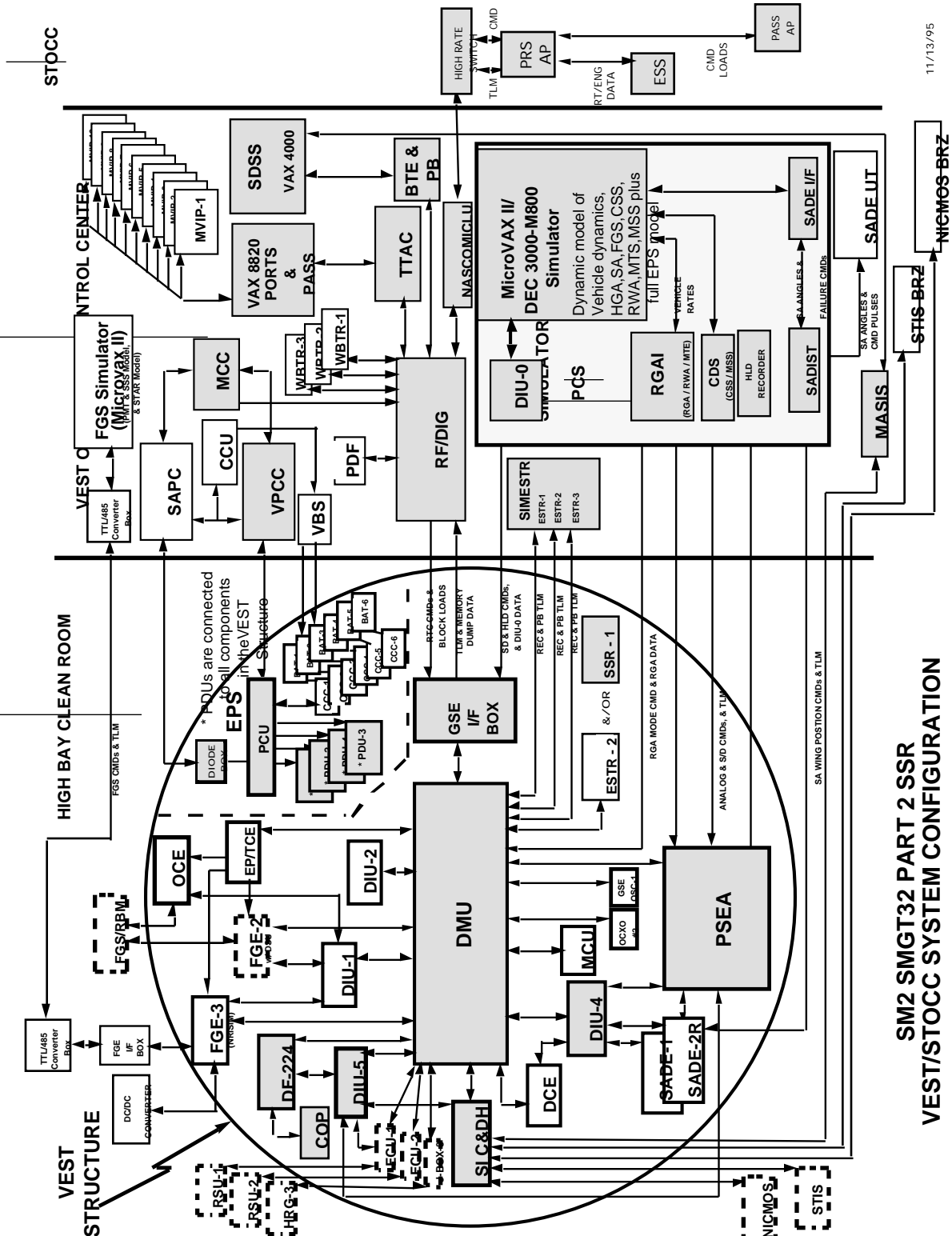


Figure B-9. PART 2 SSR H/W SMGT Overview

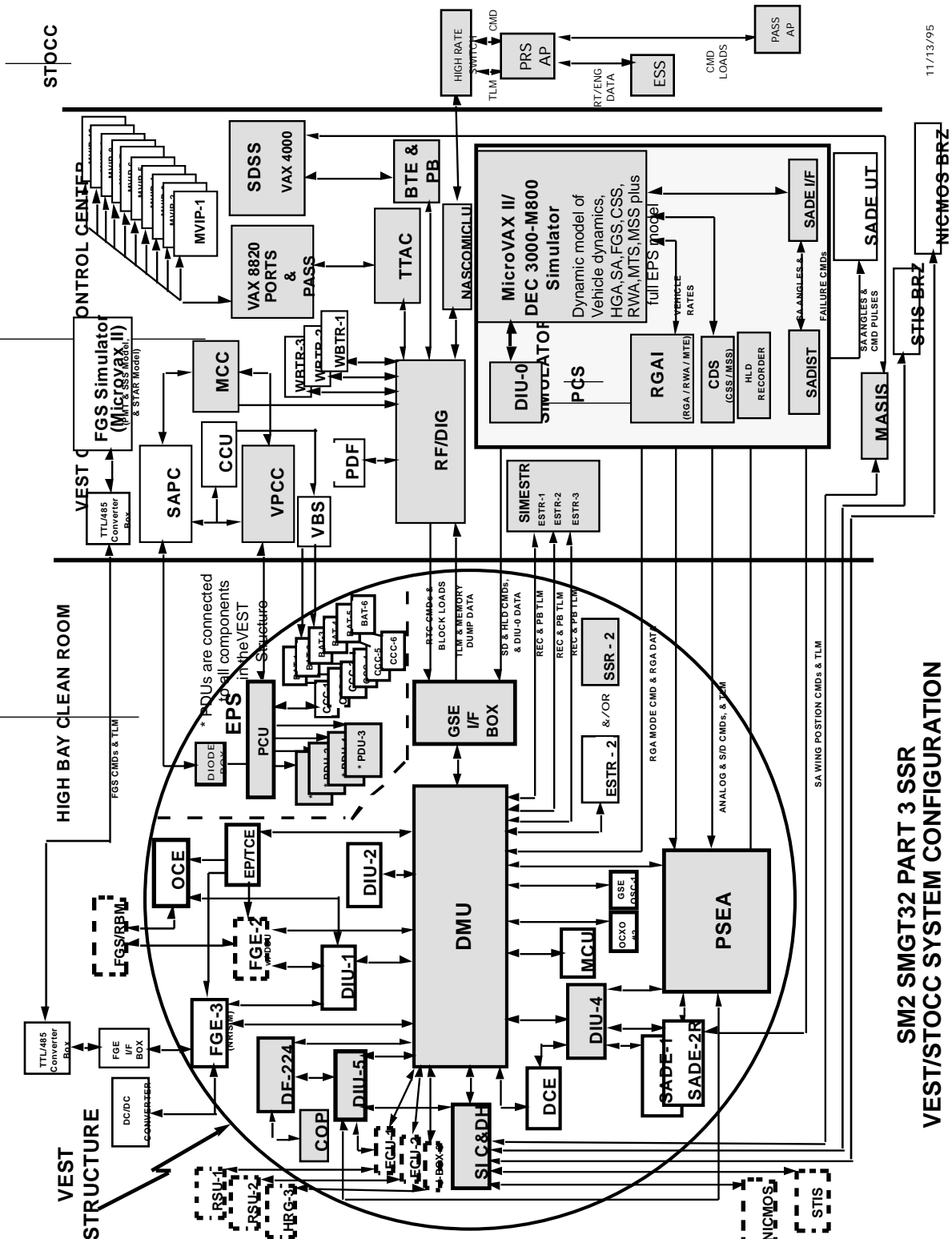


Figure B-10. PART 3 SSR H/W SMTG Overview

Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES OST will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT by maintaining the JSC command link, and trouble shooting any communication problems that may occur during the test. FS&S (Code 442) will be required to support the SMGT Test runs to insure ORU safety and functionality. The MOSES DMS SE will be required to support the test and monitor the execution of the AT/FT.

Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the SSR AT/FT.

The following ground system elements will be required to support SMGT-32:

B.8.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-32. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-32: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and embedded software during the execution of the AT/FT.

B.8.5.2 POCC Application Software Support. The PASS system, Release 28.01, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-32: SPSS, PRS, and AEDP. During SMGT-32, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets. PASS will be required to process the SPSS provided SMSs for each SSR/ESTR operational configuration to be tested.

B.8.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 32, will be required to support test activities during SMGT-32. AEDP will support the following interface connections: PASS, ESS, and OPUS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-32. AEDP will interface with ESS and OPUS for the transfer of AEDP magnetic tape products.

B.8.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-32. ESS will support the following interface connections: PRS **and** AEDP. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.8.5.5 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-32 test sessions. A portion of the PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.8.5.6 Packet Processor II. The PACOR II, Release 2.2, located in the SDPF in Building 23, will be required to support test activities during Test Session 2. PACOR II will support the following interface connections: NASCOM and OPUS. The PACOR II will interface with NASCOM for the receipt of science fill data from the VEST. Once the science fill data has been processed, SDPF will provide operations in the SMOR with the data quality statistics.

B.8.5.7 Simulation Operations Center. The SOC will be required to support activities during SMGT-32. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.8.5.8 DF224/COP. The DF224/COP located in the VEST facility will be required to support test activities for SM2 SMGT-32 tests. The DF224/COP STFS Release 9.7 (pre-released for testing) is required to provide the telemetry and command capabilities needed to support SSR operations.

B.8.5.9 NSSC-1. The NSSC-1 Flight Software release 6.0 (or later) will be required to support test activities in SM2 SMGT-32. The NSSC-1 is required to provide the science fill data needed for the AT/FT portion of the SMGT. No Science Instruments (SIs) are required for support of this test.

B.8.6 Duration

| | |
|--------------------------------------|------------|
| Test Run 1 - SMGT-32 Part 1 DRY RUN | - 12 hours |
| Test Run 2 - SMGT-32 Part 3 DRY RUN | - 12 hours |
| Test Run 3 - SMGT-32 Part 1 Test Run | - 16 hours |
| Test Run 4 - SMGT-32 Part 2 Test Run | - 12 hours |
| Test Run 5 - SMGT-32 Part 3 Test Run | - 16 hours |

B.8.7 Dependencies

The dependencies for this test include:

- Delivery of the SSR ETU and the Flight Units from Code 735.
- Delivery of the release FSW 9.7 loads from HST FSW Code 512.
- Release of SMDB22 which contains the commands, telemetry and scheduling information needed to support SSR operations.
- Delivery of PRS 9.0 which supports the Data Stream **ID** (DSID) information necessary to schedule SSR dump services.
- PASS Release 28.01 which contains the algorithm for scheduling TDRSS services for the SSR and it will be validated as part of this SMGT.
- Official release copies of the SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- All SR-3 SM upgrades to ground system have been completed and verified.
- Level 2 certified PDB that contains all commands that will be executed in SMGT-32.

- Completion of CODE 442 I&T of SSR.
- All hardware resources listed above need to be available at the time of test execution.
- Successful completion of SMGT-22.
- Delivery of a Science Institute SMGT SMS.

B.8.8 Test Schedules

These are the planned dates for SMGT-32/SSR AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

| | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 7/96 |
| - Test Plan/Procedure (Final) | 8/96 |
| - TRR | 8/96 |
| - Test Run 1, Part 1 Dry Run | 8/96 |
| - Test Run 2, Part 3 Dry Run | 8/96 |
| - Test Run 3, Part 1 Test Run | 8/96 |
| - Test Run 4, Part 2 Test Run | 8/96 |
| - Test Run 5, Part 3 Test Run | 8/96 |
| - Flash Test Report | 8/96 |
| - Test Report | 9/96 |

B.9 SMGT-34/FGS AT/FT COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-34/FGS AT/FT Command Plan Verification.

B.9.1 Purpose

SMGT-34 is a flight H/W test designed to verify the FGS Aliveness Test/Functional Test (AT/FT) portion of the command plan for the Optical Control Electronics Enhancement Kit (OCE

EK) installation portion of the Command Plan for the Second Servicing Mission.

B.9.2 Objectives

- a. To execute the FGS (AT/FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the FGS instrument.
- c. To verify the FGS/ground system interface.
- d. To verify off-line S/W used to process S-Curve data to evaluate the Fold Flat (FF) 3 positions during SM2 and SMOV.

B.9.3 Activities

SMGT-34 will consist of two test runs, a dry run in which **the** FGS simulator will be used to simulate the FGS instrument, and the execution of the test using the flight H/W. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test runs will involve the VEST, STOCC, DOC, SOC, and NASCOM. The tests will execute the FGS portion of the command plan using the H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure. The dry run will validate the

plan/procedure prior to its execution against the actual FGS instrument.

B.9.4 Roles and Responsibilities

This Section identifies the SMGT-34/FGS AT/FT and Command Plan Verification support roles and responsibilities. (See Table B-9).

Table B-9. SMGT-34

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---------------------------------|---|
| STOCC | PRS PASS, AEDP ESS PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SDPF | PACOR II | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, FGE, FGS | GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.

- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator.
Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442
VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT.
ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES **OST** will provide support during the SMGT. MOSES **OST** test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.
- MOSES OTA SE and MOSES System Management (from Hughes Danbury Optical systems (HDOS)) are responsible for running off the analysis to perform S-Curve data analysis.

NMOS PASSOPS personnel shall process FGS data with FGS Behavior Monitor to produce input file to off line analysis tools.

B.9.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-34 as listed in Table B-9.

VEST TEST FACILITIES REQUIREMENTS

The VEST facility requirements to support SMGT-34 are the Rockwell digital 2's complement 24-bit computer (DF-224) /Coprocessor (COP), Fine Guidance electronics (FGE) and the FGS instrument. The FGS Simulator will be used to simulate the FGS instrument during the dry run. The SMGT-34 configuration is given in Figure B-1.

COMMUNICATION FACILITY REQUIREMENTS

SMGT-34 will simulate the communication links between GSFC and HST during the installation of FGS. This means SMGT-34 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

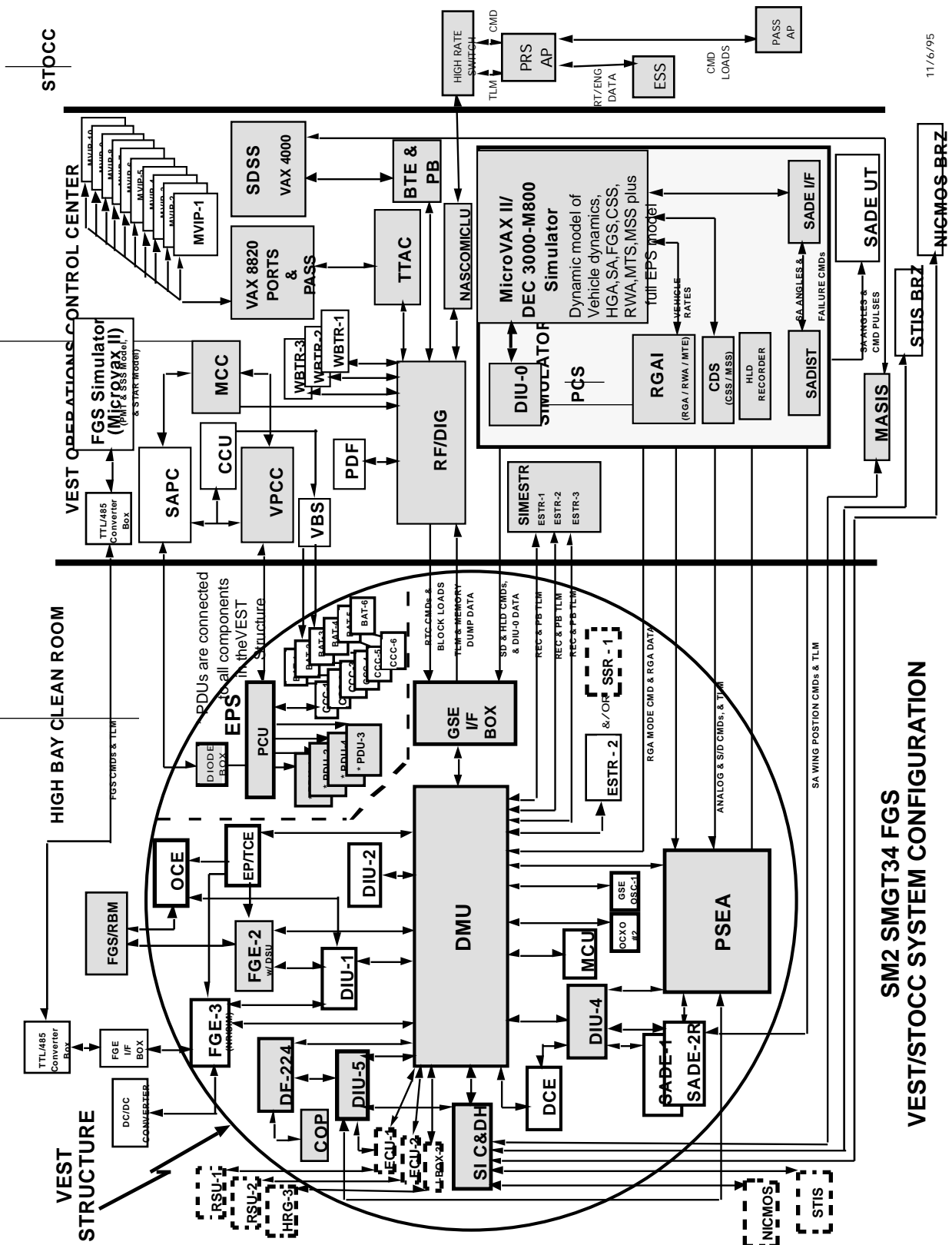


Figure B-11. FGS H/W SMTG Overview

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-34 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-11.

SMGT-34 PERSONNEL SUPPORT REQUIREMENTS

SMGT-34 test support will be required by the organizations listed in Table B-9, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES Operations Support Team will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT by maintaining the JSC command link, and trouble shooting any communication problems that may occur during the test. FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality. The MOSES OTA SE will be required to support the test and monitor the execution of the AT/FT. Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the FGS AT/FT.

The following ground system elements will be required to support SMGT-34:

B.9.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-34. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-34: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry. PRS will interface with the flight hardware and embedded software during the execution of the AT/FT.

B.9.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-34: PRS, and AEDP. During SMGT-34, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets. Following the test PASS systems will be used to produce FGS Behavior Monitor output files.

B.9.5.3 S-Curve Analysis Software. The S-Curve Analysis Software is custom S/W that will be used for the FGS FT during SM and for SMOV activities to evaluate S-Curve data. This S/W developed by MOSES will take as input flat ASCII files produced by the PASS Fbehavior Monitor S/W. The S/W will

reside on a PC connected to the GSFC Lan. There will be a PC in the STOCC area and a redundant backup PC at the NBB.

The S/W will support on-orbit adjustment of the FGS Foldflat 3 (FF3) Mirror..Two software efforts are being completed. The first software package will include processing algorithms which take raw S-Curve data from telemetry diagnostics, format the S-Curve data into standard file sizes, remove noises through averaging and smoothing as is applicable, and then cross correlating the measured S-Curve with S-Curves measured on the ground. The best fit, determined by the Cross correlation algorithm is then used to predict where the FF3 mirror is pointing and which direction it should move in. The second software development effort is a model for predicting S-Curve shapes in the presence of various optical beam aberrations. This will be used in the event the aberrations differ from the spherically aberrated beam used during FGS ground testing. The optimization of the on-orbit FGS S-Curve performance will be accomplished with these software tools.

B.9.5.4 Astrometry and Engineering Data Processor. The AEDP system, Release 34, will be required to support test activities during SMGT-34. AEDP will support the following interface connections: PASS **and** ESS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-34. AEDP will interface with ESS and OPUS for the transfer of AEDP magnetic tape products.

B.9.5.5 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-34. ESS will support the following interface connections:

PRS **and** AEDP. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.9.5.6 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-34 test sessions. A portion of the PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.9.5.7 Simulation Operations Center. The SOC will be required to support activities during SMGT-34. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.9.5.8 Fine Guidance Sensor. A Fine Guidance Sensor/Radial Bay Module (FGS/RBM) will be replaced during SM2. The 3 FGS/RBM units on HST are used for acquiring and tracking stars for purposes of guidance control and astrometry. Each unit has four photomultiplier tubes to detect light seen in the Instantaneous Field of Views. The new unit will have an Actuator Mechanism Assembly to move the Fold Flat 3 mirror to optimize the unit.

B.9.5.9 Fine Guidance Electronics. A Fine Guidance Electronics (FGE) unit is mounted on the VEST structure located in the VEST facility. The FGE contains two processors (1802, 2900) that controls the FGS/RBM. The unit receives command and issues data via DIU1.

B.9.5.10 Fine Guidance Electronics Interface Unit. Fine Guidance Electronics (FGE) Interface (I/F) unit which is the buffer for the FGE-3 commands and data to/from the FGS operates in conjunction with the FGSS. The FGE I/F unit along with FGSS provide the star information to the Fine Guidance Electronics (FGE-3) unit mounted on the VEST Structure.

B.9.5.11 Fine Guidance Sensor Simulator. The Fine Guidance Sensor Simulator is located in the VOCC in the VEST facility. The FGSS simulates Star Selector Servos (SSSs), Photomultiplier Tubes (PMTs), and stars in the field of view (FOV) and displays the encoder positions and rate commands of both start selector A and B.

The FGSS is a Micro VAX II computer and operates in conjunction with the Fine Guidance Electronics (FGE) I/F unit which is the buffer for the FGE-3 commands and data to/from the FGSS. The FGSS along with FGE I/F unit provide the star information to the Fine Guidance Electronics (FGE-3) unit mounted on the VEST Structure. The FGSS has simulator software for both tracking and Astronomer data, under fine lock only. The FGSS simulates the following:

- Simplified map of guide star positions
- Star Magnitudes
- Allows stars to be moved within a field of view

- Provides some star dynamics

B.9.6 Duration

Test Run 1 - SMGT-34 DRY RUN - 12 hours
Test Run 2 - SMGT-34 - 12 hours

B.9.7 Dependencies

The dependencies for this test include:

- Delivery of the FGS instrument from HDOS.
- Official release copies of the SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- All SR-3 SM upgrades to ground system have been completed and verified.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-34.
- Completion of CODE 442 I&T of FGS.
- All hardware resources listed above need to be available at the time of test execution.
- Successful completion of SMGT-22.

B.9.8 Test Schedules

These are the planned dates for SMGT-34/FGS AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

- | | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 7/96 |
| - Test Plan/Procedure (Final) | 8/96 |
| - TRR | 8/96 |

| | |
|----------------------|------|
| - Test Run 1 Dry Run | 8/96 |
| - Test Run 2 Test | 8/96 |
| - Flash Test Report | 8/96 |
| - Test Report | 9/96 |

B.10 SMGT-35/FSS COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-35/FSS Command Plan Verification.

B.10.1 Purpose

SMGT-35 is a flight H/W test designed to verify the FSS related portion of the command plan for the Second Servicing Mission.

B.10.2 Objectives

- a. To execute the transfer from internal (Hot) to external (FSS) power commanding sequences as defined in the SM2 Command Plan.
- b. To execute the pre-conditioning for battery charging commanding sequences as defined in the SM2 Command Plan.
- c. To execute the transfer from external (FSS) to internal (Hot) power commanding sequences as defined in the SM2 Command Plan.

B.10.3 Activities

SMGT-35 will consist of one test run, execution of the test using the flight H/W and a potential retest if required. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test runs will involve the VEST, STOCC, DOC, SOC, and NASCOM. The tests will execute the FSS portion of the command plan using the H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure.

B.10.4 Roles and Responsibilities

This Section identifies the SMGT-35/FSS AT/FT and Command Plan Verification support roles and responsibilities. (See Table B-10).

Table B-10. SMGT-35

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---|---|
| STOCC | PRS PASS, AEDP ESS CATSY, TMS, PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, SAPC, VPCC FSS, VBS/BORUS | GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator. Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.
- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Test Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
 - incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
 - sign off on the test plan/procedure at the TRR.
 - IDT support.
-
- complete all necessary work orders prior to the test set-up.
 - monitor the test execution from building 29 and assist with any anomaly resolution.

ITAV will provide communications support during the SMGT.

ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES off-line team will provide support during the SMGT.

MOSES off-line team test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

Science Institute will provide support for the SMGT. Science Institute responsibilities are:

- attend the TRR.
- provide commanding to be executed in the Commanding and Safing portion of the SMGT.

B.10.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-35 as listed in Table B-10.

VEST TEST FACILITY REQUIREMENTS

The VEST facility requirements to support SMGT-35 are the Rockwell digital 2's complement 24-bit computer (DF-224)/Coprocessor (COP), the Solar Array Power Console (SAPC), Vehicle Battery Simulator System (VBSS), and the FSS. The SMGT-35 configuration is given in Figure B-12.

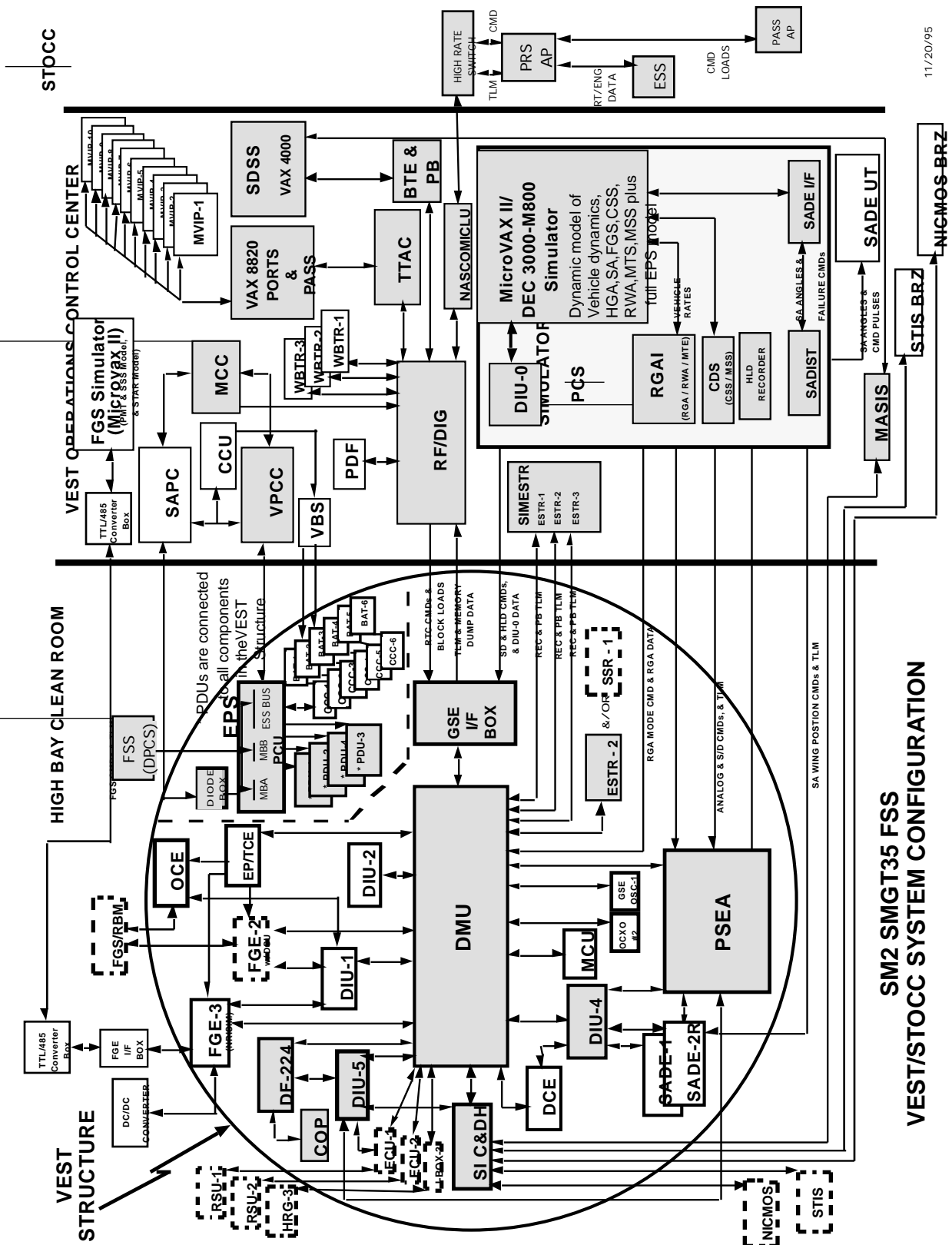


Figure B-12. FSS H/W SMTG Overview

COMMUNICATION FACILITY REQUIREMENTS

SMGT-35 will simulate the communication links between GSFC and HST during the berthing and connecting to the FSS, and the release/disconnect. This means SMGT-35 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-35 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-10.

SMGT-35 PERSONNEL SUPPORT REQUIREMENTS

SMGT-35 test support will be required by the organizations listed in Table B-10, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES OST will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT by maintaining the JSC command link, and trouble shooting any communication problems that may occur during the test. FS&S (Code 442) will be required to support the SMGT and ensure ORU safety and functionality.

The MOSES EPS SE will be required to support the test and monitor the execution of the SMGT. Additional FS&S support will be required to support the FSS test.

The following ground system elements will be required to support SMGT-35:

B.10.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-35. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-35: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry.

B.10.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-35: PRS, and AEDP. During SMGT-35, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets.

B.10.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 35, will be required to support test activities during SMGT-35. AEDP will support the following interface connections: PASS **and** ESS AEDP will interface with PASS for the receipt of telemetry captured during SMGT-35.

AEDP will interface with ESS for the transfer of AEDP magnetic tape products.

B.10.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-35. ESS will support the following interface connections: PRS, AEDP, and OPUS. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.10.5.5 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-35 test sessions. A portion of the PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.10.5.6 Simulation Operations Center. The SOC will be required to support activities during SMGT-35. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.10.5.7 Flight Support Structure. The Flight Support Structure (FSS) provides power to the VEST PCU interface, powering main A, B and the essential Buss. Figure B-11 shows the FSS and its interface to the VEST.

B.10.5.8 Solar Array Power Console. The VEST Solar Array Power Console (SAPC) is located in the VOCC and simulates HST Solar Array (SA) power for VEST operations. The SAPC is part of the VEST Power System. The SAPC simulates the HST SAs and is the primary VEST power source for the EPS after the initial power-on has been accomplished through the Vehicle Power Conditioning Console. The SAPC supplies power to the VEST load, energy to charge the VEST batteries, and the ability to discharge the VEST batteries. The VEST SAPC simulates both Solar Arrays. The VEST SAPC will be used for SMGT-35

B.10.5.9 Vehicle Battery Simulator System. The Vehicle Battery Simulator System (VBSS) is located in the located in the VOCC. The VBSS is used to represent the vehicle batteries. The VBSS will be used for SMGT-35.

B.10.6 Duration

| | |
|------------------------------|------------|
| Test Run 1 - SMGT-35 | - 12 hours |
| Test Run 2 - SMGT-35 Re-test | - 12 hours |

B.10.7 Dependencies

The dependencies for this test include:

- Official release copies of the SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-35.

- Completion of CODE 442 I&T of FSS.
- All hardware resources listed above need to be available at the time of test execution.

B.10.8 Test Schedules

These are the planned dates for SMGT-35/FSS AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

- | | |
|-------------------------------|------|
| - Test Plan/Procedure (Draft) | 7/96 |
| - Test Plan/Procedure (Final) | 8/96 |
| - TRR | 8/96 |
| - Test Run 1 Test | 8/96 |
| - Test Run 2 Re-Test | 8/96 |
| - Flash Test Report | 8/96 |
| - Test Report | 9/96 |

B.11 SMGT-36/RGA 3 AT/FT COMMAND PLAN VERIFICATION

This Section provides detail information on the SMGT-36/RGA AT/FT and Command Plan Verification.

B.11.1 Purpose

SMGT-36 is a flight H/W test designed to verify the RGA Aliveness Test/Functional Test (AT/FT) portion of the command plan for the Second Servicing Mission

B.11.2 Objectives

- a. To execute the RGA (AT/FT), and the appropriate pre and post conditioning commanding sequences as defined in the SM2 Command Plan.
- b. To verify the ground system can support the installation and operation of the RGA

B.11.3 Activities

SMGT-36 will consist of two test runs, a dry run and the execution of the test using the flight H/W. These test sessions will ensure that all test objectives and requirements covered by this SMGT are verified.

The test runs will involve the VEST, STOCC, DOC, SOC, and NASCOM. The tests will execute the RGA portion of the command plan using the H/W. The command plan will be used as the test plan/procedure with pre-test set-up and post-test processing added to make it complete. The command plan will be redlined to bypass any commands or sequences that cannot be executed using the available test set-up. These sequences will be identified and noted for exclusion during the review cycle of the test procedure. The dry run will validate the plan/procedure prior to its execution against the actual RGA hardware.

B.11.4 Roles and Responsibilities

This Section identifies the SMGT-36/RGA AT/FT Command Plan Verification support roles and responsibilities. (See Table B-11).

Table B-11. SMGT-36

| SUPPORT AREA | SYSTEM/RESOURCES | ORGANIZATION |
|---------------------|---------------------------------|---|
| STOCC | PRS PASS, AEDP ESS PDB | LORAL/LMTO ATSC LORAL/LMTO/ATSC LMTO |
| DOC | AP/TTAC/COMM | ATSC |
| SOC | SOC SIMULATOR | ATSC |
| VEST | DF224/COP, RGA | GSFC CODE 442 |
| ITAV | N/A | CTA |
| SVG | N/A | MOSES |
| O&GS SMSE | N/A | GSFC CODE 441 |
| SYSTEMS ENGINEERING | N/A | MOSES |
| IDT | N/A | GSFC CODE 442 |

The O&GS SMSE will serve as the test director. The test director's responsibilities for the test are:

- chair the TRR and ensure that all resulting redlines are incorporated into the test plan/procedure prior to test execution.
- overall execution of the test.
- conduct the test pre-brief and post-test briefing on the network.
- preside over the actual test execution.
- test flow.
- anomaly resolution.
- coordination of test personnel.
- approve realtime deviations to the test plan/procedure.

The Lead Organization will serve as the Test Coordinator. Test coordinator's responsibilities for the test are:

- attend the TRR.
- preparing the test plan/procedure.

- scheduling of the resources required to run the test.
- ensuring test prerequisites are satisfied prior to the test.
- collecting inputs to the test reports.
- issuing both the flash and final test reports.
- test set-up, and post-test wrap-up.
- obtain concurrence from IDT on Tes Plan and Procedures.

Code 442 will provide test support from the VEST. Code 442 VEST responsibilities are:

- attend the TRR.
- incorporate any special set-up or commanding instructions into the test plan/procedure for the VEST interface.
- sign off on the test plan/procedure at the TRR.
- complete all necessary work orders prior to the test set-up.
- monitor the test execution from building 29 and assist with any anomaly resolution.
- IDT support.

ITAV will provide communications support during the SMGT. ITAV responsibilities are:

- attend the TRR.
- issue the briefing message at least 48 hours prior to the test.
- establish all appropriate communication configurations required to execute the test during the VEST set-up.
- maintain communications throughout the test.
- troubleshoot any communications problems during the test.

The MOSES OST will provide support during the SMGT. MOSES OST test conductor and participants responsibilities are:

- review the test plan/procedure.
- attend the TRR.
- support the test through pre and post-test briefings.
- serve as test conductors.
- staff the consoles.
- send all commands contained in the test plan/procedure.

MOSES SE support will provide support for the SMGT. MOSES SE responsibilities are:

- support the plan/procedure writing phase to contribute to and review the test plan/procedure.
- attend the TRR.
- monitor a console during that portion of the SMGT that has commanding related to their subsystem.

B.11.5 System/Facility Requirements

This section identifies the interfaces and functionality required from each of the systems and/or facilities involved in SMGT-36 as listed in Table B-11.

VEST TEST FACILITY REQUIREMENTS

The VEST facility requirements to support SMGT-36 are the Rockwell digital 2's complement 24-bit computer (DF-224)/Coprocessor (COP) and the RGA hardware. The SMGT-36 configuration is given in Figure B-11.

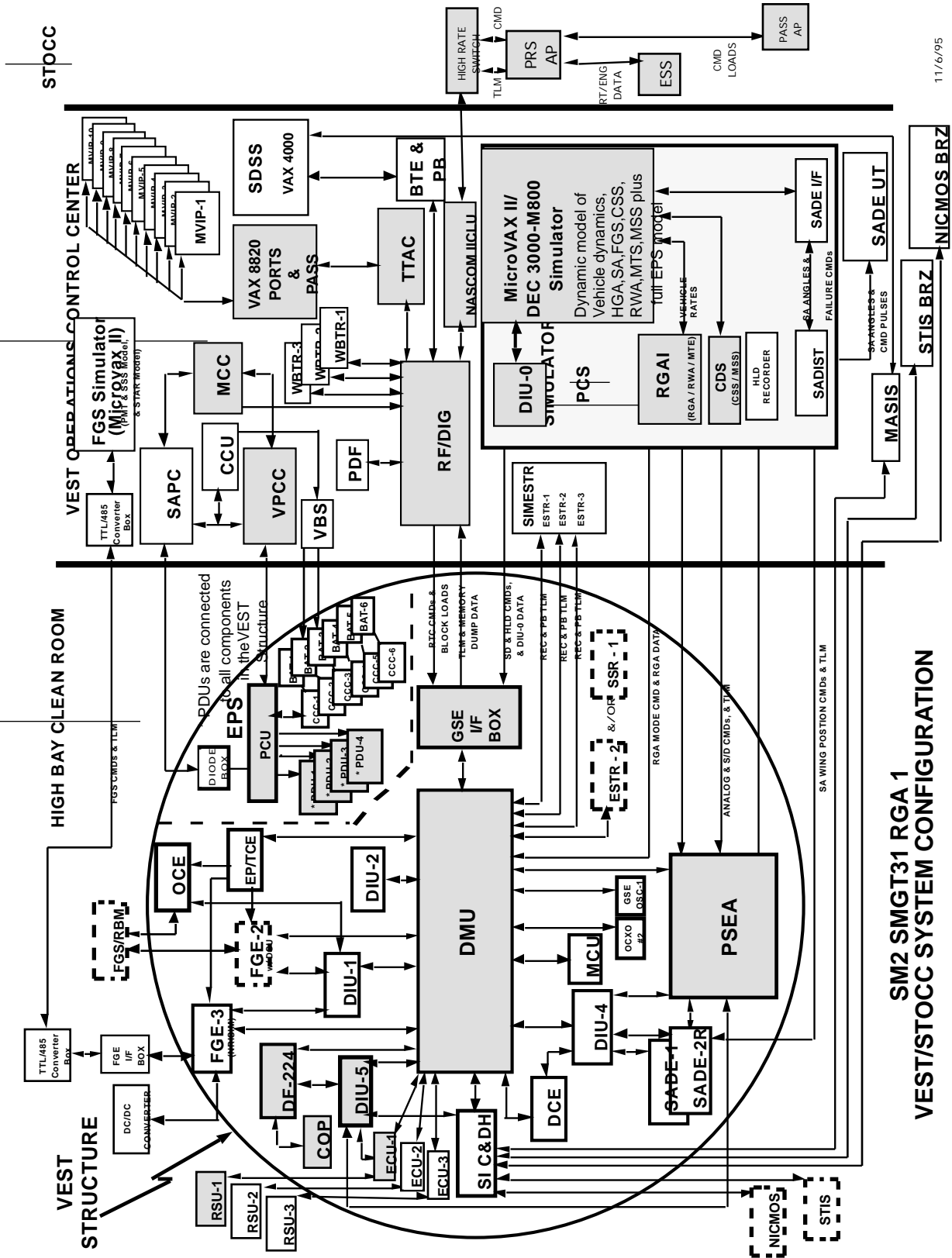


Figure B-13. RGA H/W SMTG Overview

COMMUNICATION FACILITY REQUIREMENTS

SMGT-36 will simulate the communication links between GSFC and HST during the installation of RGA. This means SMGT-36 will be conducted in JSC mode. NASCOM and the SOC will be required to support this test. Data circuits will be configured at the start of the test by ITAV to simulate JSC mode.

STOCC HARDWARE FACILITY REQUIREMENTS

SMGT-36 will be conducted in the SMOR, with DOC support. The Micro Virtual Interface Processors (MVIPs) and printers in the SEER will be required to support this test. A PRS, AP, TTAC and high rate switch will also be required to support this test. These resources will be scheduled prior to test start by the lead organization. The STOCC software system requirements are listed above in Table B-11.

SMGT-36 PERSONNEL SUPPORT REQUIREMENTS

SMGT-36 test support will be required by the organizations listed in Table B-1, and in the roles and responsibility section. The O&GS SMSE will serve as the test director. Lead Organization will serve as the Test Coordinator. VEST personnel will support the SMGT from Building 29, and the MOSES OST will support the test from the SMOR. Normal daily DOC support will be used, no additional personnel are required in the DOC or NASCOM. One SOC person will be required to support the SMGT by maintaining the JSC command link, and trouble shooting any communication problems that may occur during the test. FS&S (Code 442) will be required

to support the SMGT and ensure ORU safety and functionality. The MOSES SE will be required to support the test and monitor the execution of the AT/FT. Additional MOSES SE support will be required to support any other subsystem commanding that is contained in the RGA AT/FT.

The following ground system elements will be required to support SMGT-36:

B.11.5.1 PORTS Refurbishment System. The PRS system, Release 9.0, will be required to support test activities in SMGT-36. PRS will be configured to support command generation and telemetry and dump processing. PRS will be required to support the following interface connections for SMGT-36: NASCOM (for connection to SOC and the VEST hardware), PASS, ESS and the flight hardware. PRS will interface with NASCOM for the receipt of engineering telemetry and the transfer of realtime commands and OBC loads. PRS will interface with PASS for the transfer of engineering telemetry and the receipt of OBC loads. PRS will interface with ESS for the transfer of engineering telemetry.

B.11.5.2 POCC Application Software Support. The PASS system, Release 28, will be required to support test activities during the test session. PASS will support the following interface connections for SMGT-36: PRS, and AEDP. During SMGT-36, PASS will interface with PRS for the receipt of engineering telemetry and AEDP for the transfer of telemetry subsets.

B.11.5.3 Astrometry and Engineering Data Processor. The AEDP system, Release 24, will be required to support test activities during SMGT-36. AEDP will support the following interface connections: PASS, and ESS. AEDP will interface with PASS for the receipt of telemetry captured during SMGT-36.

B.11.5.4 Engineering Support System. The ESS system, Release 3.8, will be required to support test activities during SMGT-36. ESS will support the following interface connections: PRS, and AEDP. ESS will interface with PRS for the receipt of realtime engineering telemetry and history tapes. ESS will interface with AEDP for the receipt of Astrometry and engineering data tapes.

B.11.5.5 Project Data Base. The PDB, Release SMDB22, will be used during interface, regression testing, and all SMGT-36 test sessions. Applicable PDB files will be validated by MOSES SVG personnel and IDTs prior to test execution.

B.11.5.6 Simulation Operations Center. The SOC will be required to support activities during SMGT-36. The SOC will be required to interface with the VEST and the HST MOC. The SOC will provide these interfaces for the receipt of spacecraft engineering telemetry from the VEST, receipt of JSC commands from the HST MOC and the transfer of reformatted HST commands and JSC telemetry. The SOC will also receive JSC commands from the HST MOC which will be reformatted into TDRSS blocks and then routed to the VEST.

B.11.5.7 DF224/COP. The DF224/COP located in the VEST facility will be required to support test activities for SM2.

B.11.6 Duration

Test Run 1 - SMGT-36 DRY RUN - 12 hours
Test Run 2 - SMGT-36 - 12 hours

B.11.7 Dependencies

The dependencies for this test include:

- Delivery of the RGA hardware from Allied-Signal
- Official release copies of the SMPART generated SMIT and Command Plan. This needs to be the latest version, and as close to the actual flight version as is possible. This should be available in softcopy.
- Level 2 certified PDB that contain all commands that will be executed in SMGT-36.
- Completion of CODE 442 I&T of RGA.
- All hardware resources listed above need to be available at the time of test execution.

B.11.8 Test Schedules

These are the planned dates for SMGT-36/RGA AT/FT and Command Plan Verification activities, based on the most recent version of the O&GS Project Schedule.

- Test Plan/Procedure (Draft) 2/96
- Test Plan/Procedure (Final) 2/96
- TRR 3/96

| | | |
|---|--------------------|------|
| - | Test Run 1 Dry Run | 3/96 |
| - | Test Run 2 Test | 8/96 |
| - | Flash Test Report | 3/96 |
| - | Test Report | 4/96 |